AN
EVOLUTION
IN
ELECTRICITY.

22102347457

Med
K13309

ELECTROZONE

AND

MEDITRINA.

A RECORD OF FACTS AND INFORMATION.

London:

THE BRITISH ELECTROZONE CORPORATION, LTD.,

TRAFALGAR BUILDINGS, CHARING CROSS.

1896.

Ede, Dearberg & Co.,
1, Maiden Lane,
Queen Street, Cheapside,
London, E.C.

WELLCOME INSTITUTE
LIBRARY
Coll. welMOmec
Call
No. WM

TO

THE MEMBERS OF THE MEDICAL PROFESSION,

Whose Beneficent Duty it is to prevent and heal all manner of disease, and to relieve all manner of sickness among the people;

TO ALL NURSES OF THE SICK;

AND TO ALL OFFICERS OF PUBLIC HEALTH,

THIS LITTLE BOOK

Concerning one of the most powerful and effective non-poisonous and non-coagulant Germ-destroyers available for their use,

IS DEDICATED.

Digitized by the Internet Archive
in 2016

https://archive.org/details/b28094487

TABLE OF CONTENTS.

INTRODUCTION.

ELECTROZONE: WHAT IS IT?—Its essential product long recommended in the British Pharmacopoeia—Electrozone a disintegrator, not a coagulant—Scientific definition of Electrozone—Declared to be "the best practical disinfectant in the world" - 9 to 12

CHAPTER I.

WHAT IS CLAIMED FOR ELECTROZONE—Analysis by the Public Analyst for Essex: Electrozone "possesses antiseptic, germicidal, and disinfectant properties to a remarkable degree"—Bellevue Hospital Analysis—Chemist Martin's Analysis—Dr. Cyrus Edson's Endorsement of Chemists' Analyses and Emphatic Recommendation—Dr. Ogden Doremus on the varied uses of Electrozone—*Bacteriological Investigations:* searching tests and results—Cholera, typhus, diphtheria, and other bacteria destroyed with a weak solution of Electrozone—Disinfecting Properties on Sporeless Bacteria—Endorsements as to superiority over Carbolic Acid and Corrosive Sublimate—Anthrax Spore, most resistant of all spores, destroyed in three minutes—Official Reports of N.Y. Board of Health—Bacteria in Drinking Waters—Typhoid and Diphtheria Bacilli destroyed in one minute—Electrozone even better in dealing with natural germs than with cultivated germs—Deaths from germ diseases largely preventible by use of Electrozone - - - 13 to 35

CHAPTER II.

PURIFICATION OF DRINKING-WATER AND RUNNING STREAMS—How the Croton Water-Supply of New York was freed from serious danger Spraying of Tonnetta Brook—Sewage containing ten million bacteria per cubic centimetre sterilized after ninety minutes—Considerable lowering of death rate through purification of drinking-water by Electrozone—What may be done for the cleansing and sweetening of the Thames, Trent, Avon, Liffey, Manchester Ship Canal, and all other water-courses requiring purification - 36 to 40

CHAPTER III.

ELECTROZONE AS A DEODORIZER OF SEWAGE AND GARBAGE, AND AS A HOUSEHOLD NECESSITY—Canal Street, New York: "Stench horrible, seemed almost to fracture the olfactory nerves": instant change, water transparent, odour of ozone—Riker's Island, a worse than Augean stable—One million cubic yards of festering, noisome, fermenting, garbage—Filthy water near the island, under the influence of electrolysis, providing the purifying agent—Description of plant employed—Over an area of thirty acres death to every foul germ, gas, and odour in less than twenty-one days—Extraordinarily quick action of Electrozone on putrid matter—"In a few seconds the evil-looking scum had gone for ever"—Electrozone contrasted with Destructors and other Garbage Destroyers—Testimony from the official chemist of New Orleans—What an English observer saw on Riker's Island in September, 1895—

Application of Electrozone to Town Sewage:

W. L. Hedenberg's Article "Engineering Magazine," Aug., 1895

W. P. Digby, Electrical Engineer, on what he saw at Brewster's and Danbury in Feb, 1896

Professor John W. Langley's investigations at Cleveland, Ohio

Editorial in "Electricity," Nov. 20, 1895

Professor A. E. Dolbear, on "Electricity in Disinfection," in "Cosmopolitan Magazine," Jan., 1896

CHAPTER III—*continued.*

ELECTROZONE AS A DEODORIZER OF SEWAGE AND GARBAGE, AND AS A HOUSEHOLD NECESSITY—*continued.*
Practical uses of Electrozone—English Demonstrations - - - - - - 41 to 60

CHAPTER IV.

ELECTROZONE A REMEDY FOR HUMAN AND ANIMAL DISEASES, AND INVALUABLE FOR DOMESTIC AND HOUSEHOLD USE—Personal Testimony regarding the Electrozone Enterprise—Popularity as a Medicine and as a Disinfectant—Efficacy in Treatment of Animal Ailments—The National Board of Health Magazine - - 61 to 82

Testimonials as to the Value of Electrozone:
In Throat Diseases, Blood Poisoning, Sores, etc., etc., etc.
In Ophthalmic Practice.
Action on Diphtheritic Membrane
Extract from a Doctor's Case Book
As a Cholera Cure
As a Speedy Cure for Hemorrhoids
Purulent Discharges from the Middle Ear
In Regimental Armouries.
In Veterinary Practice
The "Southern Cultivator" on Electrozone as a Remedy for Hog Cholera.

CHAPTER V.

ELECTROZONE AND MEDITRINA—What they are good for. Electrozone and Meditrina successfully used in the Treatment of Human Ailments—Animal Ailments. Invaluable for Domestic and Household Uses—For Disinfecting Sick Rooms — To Physicians and Surgeons - - - - - - 83 to 87

APPENDIX.

SOME PRESS NOTICES OF ELECTROZONE, AND OF WHAT IS BEING DONE WITH IT.

"New York Ledger" — "Frank Leslie's Weekly" "Electrical Engineer" - - - - - 88 to 99

INTRODUCTION.

ELECTROZONE:

WHAT IS IT?

In relation to disinfectants, antiseptics, and deodorants, Electrozone accomplishes results which, as will be shown in the following pages, place it far in advance of any preparation known to science for the treatment of sewage and garbage or impurities of any kind. As a remedy in the hands of a medical man, in relation to all diseases of a germ origin, it is the most marvellous destroyer of noxious micro-organisms of which the British Pharmacopoeia contains any record. The essential principle in Electrozone has long been known in Pharmacy; reference is to be found to it in every edition—from the earliest to the latest—of the British Pharmacopoeia. As with British physicians so with foreign practitioners. Nearly thirty years ago Von Graefe recommended it; more recently Schmidt-Rimpler has returned to it for the treatment of certain diseases in a purulent form.

Since the days of Faraday it has been common knowledge that the electrolysis of sea-water generates chlorine, bromine, and other compounds which are well known disinfectants and microbe killers. But, until now, the remedy has not been available in a form useful to the medical man and to the sanitarian. The hypochlorites were easily generated ; they as readily escaped from the liquid in which they were formed. Now, however, in the form of Electrozone, these most beneficent germ destroyers, in large quantities, are fixed so securely that, if the liquid containing them be well corked, after a few years they are found to be as numerous and as potent for destruction as at the moment when they are produced.

Seven-eighths of the diseases incidental to humanity owe their origin and continuance to the presence of noxious germs. In Electrozone is to be found a remedy which never fails to kill any germ however great its natural resistant-power. Unlike carbolic acid, per-chloride of mercury, sulphuric acid, and the like, which coagulate the albumen in which the germs exist, Electrozone dissolves the albumen and disintegrates the germ. It absolutely destroys the germ. It never fails to destroy, to disintegrate.

Electrozone, in its various forms, and Meditrina, its medicinal form, are pure sea-water acted upon by electricity ; or, for purely disinfectant purposes, Electrozone is water containing a given quantity of common salt or brine and subjected to electricity. Such electro-chemical action takes place that the chlorine, bromine, and iodine constituents of sea-water, which have long been recognized as the most valuable of disease-arresting agents and disinfectants, are liberated and assume the most efficient and non-poisonous form for the destruction of noxious germ life of whatever kind ; and, with ordinary salt solution, the chlorine is rendered readily available for disinfecting and purifying purposes. The components of sea-water, which include nearly all the known natural elements, are favourably acted upon, with the result that many other most useful, health-giving and harmless compounds, are produced.

MR. EDWARD W. MARTIN,

CHEMIST TO THE HEALTH DEPARTMENT OF NEW YORK CITY

REPORTING IN *October* 19*th*, 1892,

thus scientifically describes the action of

Electrozone:—

"When the hypochlorites are brought in contact with "organic matter—such as bacteria—chlorine is set free, "which unites with the hydrogen of the organic matter, "thus destroying all germs contained therein. Ozone "is formed, together with nascent oxygen and per- "oxide of hydrogen, which oxidizes and disintegrates "the remaining portions of the organic material.

"In my opinion, the solution in question will prove an "absolute disinfectant to organic matter either of "animal or vegetable origin."

It may be repeated that Electrozone contains that which constitutes it the most perfect germicide and the best disinfectant, antiseptic, and deodorizer ever submitted to scientific and medical investigation and use. At the same time it is ABSOLUTELY NON-POISONOUS AND NON-INJURIOUS, AND MAY BE USED with perfect safety, internally and externally, and UNDER EVERY CONDITION OF SICKNESS AND HEALTH.

DR. CYRUS EDSON,

PRESIDENT OF THE NEW YORK BOARD OF HEALTH,

STATES :—

April 30th, 1893.

"This invention is one of the greatest discoveries from a "sanitary point of view ever made. I feel that, on "account of its efficiency, cheapness, and absolute safety, "IT IS THE BEST PRACTICAL DISINFECTANT IN THE "WORLD, and that its use will become universal."

Medical testimonies as to its use in human diseases are equally emphatic and unreserved.

CHAPTER I.

WHAT IS CLAIMED FOR ELECTROZONE.

1.—The Woolf process of Electrolizing sea-water or a saline liquid produces a large number of grains of

$\mathrm{Na.\ Cl.\ O.}$
$\mathrm{Mg.\ Cl._2\ O._3}$
$\mathrm{Ca.\ Cl._2\ O._2}$
$\mathrm{K.\ Cl.\ O.}$
$\mathrm{K.\ Br.\ O.}$
$\mathrm{Na.\ I.\ O.}$
$\mathrm{Na.\ H.\ SO._2}$

2.—The above-mentioned compounds are held in solution, remain stable until released by being brought into contact with disease germs, and will so remain for years in unimpaired vitality.

3.—When brought into contact with such germs, chlorine is set free and unites with the hydrogen of the organic matter, entirely disintegrating such organic matter, acting ALWAYS and UNIFORMLY as a germicide.

4.—Electrozone is a perfect antiseptic.

5.—Electrozone is a perfect deodorant.

6.—When employed as a remedy for all diseases of a germ origin—whether in the human being or in animals—beneficial results, of necessity, follow.

In support of the foregoing the following evidence is submitted :—

I.

ANALYSIS BY THE PUBLIC ANALYST FOR ESSEX.[*]

I beg to report to you my analysis of "ELECTROZONE" and "MEDITRINA," and, at the same time, beg to furnish you with the results of some experiments I have made with these products.

ELECTROZONE.

The following were the analytical results I obtained :—

Specific Gravity	1018.6		
Re-action	Very slightly alkaline.		
Total Solids	1743	grains	per gallon.
Combined Chlorine as Chlorides	670·9	do.	do.
Equal to Chloride of Sodium	1105·7	do.	do.
Chlorine, existing as Hypochlorites, and capable of being liberated by action of acids	375	do.	do.

Electrozone is thus what it is represented to be, namely, an electrolized form of sea-water, and contains a large proportion of the original Chlorine with small quantities of Iodine and Bromine in a condition in which the well-known deodorizing effect of these bodies can be exerted upon any organic substances with which the liquid is brought in contact. Its action is, practically, an oxidizing one, for the Chlorine, as it is liberated by the action of acids and even to some extent by the carbonic acid in the atmosphere, reacts on water, and evolves oxygen which, in its nascent condition, has a most powerful effect on all organic bodies, especially such as are in an incipient state of putrefaction. The quantity of available Chlorine is equivalent to 175 grains of oxygen per gallon, so that every gallon of Electrozone is capable of liberating nearly twice its own volume of oxygen gas in its most active condition. I was not, therefore, surprised to find that **Electrozone** exerts a most powerful action on all animal and vegetable substances ; it **possesses,** in fact, **antiseptic, germicidal, and disinfectant properties to a remarkable degree,** and these are manifested **directly** the fluid is applied to any decomposing organic substances, with the result that **all living organisms cease to exist,** and putrefaction is at once arrested. I have tried the effect of Electrozone on various putrid substances, and have found that the evolution of fetid odours is immediately checked. It appears, to me, therefore, that this product will be found most efficacious in deodorizing the sewage of towns, and checking those putrefactive changes which are so detrimental to public health.

---

[*] Thomas A. Pooley, B.Sc., F.I.C., F.C.S., Analytical and Consulting Chemist, and Public Analyst for the County of Essex.

I have, in addition, made some experiments on the action of Electrozone on polluted water supplies, and find that when applied in the proportion of one part to 10,000 parts of water, it oxidized nearly the whole of the organic matter so that only traces of albuminoid ammonia were left. I further noticed, that Electrozone immediately destroyed the vitality of any living organisms which such polluted waters contained.

MEDITRINA.

The following were the results of my analysis of this liquid :—

Specific Gravity	1020·3
Re-action	Very slightly alkaline.
Total Solids	2065 grains per gallon.
Combined Chlorine as Chlorides ...	760·4 grains per gallon.
Equal to Chloride of Sodium ...	1253 do. do.
Chlorine, as Hypochlorites, and capable of being liberated by action of acids	395 do. do.

Meditrina, like Electrozone, also contains, in addition to Chlorine, traces of Bromine and Iodine in a corresponding weak state of combination with Sodium, Potassium, Magnesium, and Calcium. It is, however, somewhat stronger, and is specially prepared for medicinal use. The marked action of these oxidizing bodies on organic tissues must render Meditrina a most valuable preparation for external application, by spray or otherwise, while its non-poisonous nature will allow it to be administered in many ailments which are known to be caused by the action of living organisms.

Thus far, Mr. Pooley. Similar analyses by other eminent British analysts show a like result. There is no variableness in the respective analyses. One always bears out another.

II.

ANALYSES BY BOARD OF HEALTH OF NEW YORK CITY.

Department of Public Charities and Correction,
General Drug Department,
Bellevue Hospital, New York,
December 7th, 1892.

Report on the Electrical Disinfectant Electrozone.

In accordance with a pre-arranged appointment, I visited the office of the Electric Disinfectant at 9.30 a.m. to-day, for the purpose of procuring authentic specimens of the products of the process, conducted in my presence, upon materials brought there by myself.

The material I procured was sea-water taken from the East river between Twenty-sixth and Twenty-eighth streets.

The water had a specific gravity of 1·018 at 60° F.

Upon arrival at the office, I emptied one gallon of the above water into a clean glass tank, an electrode was inserted in the liquid and an electric current passed through the liquid. During this time a notable quantity of chlorine escaped, there being no special provision made to save this. Of course, when the process is worked on a manufacturing scale, this loss is prevented.

After removing the product to my laboratory, I found the following results :—

PER GALLON.

Total chlorine, calculated to chloride of sodium so as to obtain a comparison with the amount of sodium chloride present before treatment	925 grains.

TOTAL CHLORINE.

Before treatment	755 grains.
After treatment	556 grains.
Loss	199 grains.
Chlorine, combined to sodium hypochlorite, so-called "available chlorine"	179·6 grains.

It is the last named upon which the disinfectant properties of the product chiefly depend.

The water had acquired a slightly alkaline reaction during the process.

The results obtained by me agree quite closely with those reported by others, and bear out the statements of the inventor of the process.

CHARLES RICE, *Chemist*,

DEPARTMENT OF PUBLIC CHARITIES AND
CORRECTION.

III.

HEALTH DEPARTMENT,
301, MOTT STREET, NEW YORK,
October 19*th*, 1892.

CYRUS EDSON, M.D.
Sanitary Superintendent.

SIR,—I have the honour to report the following results of the examination of samples of water taken at the foot of Rector Street, from North River, before and after its partial decomposition by an electric current :

	BEFORE	AFTER
Grains per gallon of chlorides calculated to chloride of sodium	1318·45	896·08
Hypochlorites calculated to hypochlorite of sodium		391·00
Available chlorine		186·32

From the above analysis the effect of the electric current appears to be :

1st.—Decomposition of the chlorides, bromides, and iodides, with the production of chlorine, bromine, and iodine.

2nd.—The water becomes neutral or faintly alkaline.

3rd.—The formation of hypochlorites, hypobromites, etc.

EDWARD W. MARTIN, *Chemist.*

The Sanitary Superintendent of the city, Dr. Cyrus Edson, accompanied the above reports with comments of his own of so thorough and of so satisfactory a character as to call for quotation in full at this point. Dr. Edson's statement was in these terms :—

IV.

Health Department,
301, Mott Street, New York,
November 22nd, 1892.

EMMONS CLARK, *Secretary.*

Sir,—I have the honour to forward herewith reports of Dr. Herman M. Biggs, Chief Inspector in charge of Disinfection and Bacteriology, and of E. W. Martin, the Chemist of this Department, on the subject of the disinfecting solution produced by the action of the electrical current electrolizing sea-water.

I find in the report of Dr. Biggs, that many tests have been made under his direction by competent and expert bacteriologists, in which are included a series of experiments made by Mr. Beebe on anthrax spores and staphylococcus pyogenes aureus. The result as reported shows " in all cases save the exposure of anthrax for one minute to a ten per cent. solution, the liquid exercises a marked inhibiting effect on the growth of the micro-organisms employed.

The experiments made under the general direction of Dr. T. Mitchell Prudden, showed the disinfectant to be partially effective in some cases, and entirely so in others. The low cost of the electrolized sea-water would, however, allow a more liberal use, in which case more rapid and better results would have been obtained. "The materials used in these experiments were fluid typhoid fœces and common hard fœces. To each of these were added the spirilla of cholera Asiatica. The fœces contained very numerous bacilli coli com. No cholera colonies developed in any of the plates exposed ten minutes or over. Control cultures, however, contained very many cholera colonies.

The experiments of Dr. Dunham, cited in Dr. Biggs' report, show electrolized sea-water to be a potent and effective agent for the destruction of the cholera spirillum. Experiments made by this expert show that no cholera colonies developed after an exposure of thirty seconds to the disinfecting agent, although very large numbers were present in the controls.

The comparative tests made by Dr. Biggs would seem to verify the report of Chemist Martin.

There is no doubt that the efficiency of Electrozone is due not alone to the chlorine and bromine and their compounds, or hypochlorites and hypobromites, but also to the presence of ozone, which is formed by the decomposition of the hypochlorites in the presence of organic matter.

We have, in this Electrozone, in my opinion, a disinfecting agent combining powerful disinfecting and deodorizing properties with unprecedentedly low cost, to be made at any time, in any quantity, at any place ; a disinfectant that, in consequence of its cheapness and non-poisonous quality, can be used so freely and universally as to make its discovery one of the most important, from a sanitary standpoint, that has ever been made. Its deodorant properties will give it a wide applicability in the abating of nuisances caused by so-called offensive trades. The conclusion of Dr. Biggs that "this disinfectant is efficient apparently under all conditions for the disinfection of the spirillum of Asiatic cholera," is most valuable information at this time for the consideration of the Board.

I respectfully recommend that steps be taken by the Board of Health to acquire the use of a suitable plant, to be located at the Disinfecting Depot in East Sixteenth street, for the purpose of producing the disinfectant in question, and at such other places, or for such other uses, as in the discretion of the Board would be advisable.

Very respectfully,

(Signed) CYRUS EDSON, M.D.,

Sanitary Superintendent.

Further general and highly valuable testimony is to be found in a communication from a physician and scientist of high repute in the United Kingdom as well as in America, Dr. Ogden Doremus, who has written the following letter :—

IV.

"LABORATORY,

"THE COLLEGE OF THE CITY OF NEW YORK.

"I have witnessed the preparation of your 'Electrical Disinfectant,' [Electrozone.]

"I find it contains chlorine gas, hypochlorites of sodium, potassium, magnesium and calcium ; also some chlorites and chlorates of these metals ; likewise a percentage of bromine compounds.

" *These agents are universally recognized as the most powerful disinfectants, and I have tested the liquid and find it almost instantaneously effective.*

" As it can be produced at a small cost, it can be liberally employed in large quantities for washing streets, sprinkling excavations made in them (which are known to evolve injurious emanations) ; flushing sewers, the openings of which discharge gases which contaminate the atmosphere of cities, and are the causes of many maladies.

" All these poisonous gases would be decomposed and rendered innocuous.

" The handling of garbage is a grave matter to every community. The application of your cheap and potent agent would remove all offensive odours therefrom, thoroughly disinfect and check further decomposition.

" Malarious districts of cities would be readily purified and made wholesome by its use.

" It should be liberally employed in hospitals, and infected vessels would be speedily disinfected by its use.

" I would recommend a free use of your 'Electrical Disinfectant' in private dwellings, as by its use many sicknesses caused by the unavoidable escape of sewer gases would be prevented. Its use in sick rooms would be invaluable.

" The generous use of the 'Electrical Disinfectant' in any city would be of great importance, as it would destroy noxious gases and germs, and would diminish the percentage of sickness and death in a marked degree."

(Signed) OGDEN DOREMUS, M.D.

BACTERIOLOGICAL INVESTIGATION.

In one of the leading institutions in London, a series of experiments were, in December, 1895, made to determine the Antiseptic properties of Electrozone ; *i.e.*, the quantity of Electrozone necessary to be added to a nutrient medium in order to prevent a growth of Bacteria. The method adopted was the following :—

Tubes containing ten cubic centimeters of sterile nutrient broth were prepared, and measured quantities of Electrozone were added. The tubes were then inoculated, by means of a previously sterilized platinum wire, with pure cultivations of various bacteria. After inoculation, the tubes were placed in an incubator and the contents examined microscopically from day to day. Any growth could thus readily be observed. Control experiments were made in each instance ; that is to say, broth tubes, to which no Electrozone had been added, were inoculated at the same time.

The following Bacteria were used :—

Bacillus Coli Com.
Typhoid Bacillus.
Cholera Vibrio.
Bacillus of Fowl Cholera.
Diphtheria Bacillus.
Pseudo-diphtheria Bacillus.
Bacillus Prodigiosus.
Bacillus Pyocyaneus.
Staphylococcus Pyogenes aureus.
Anthrax Bacillus.
Bacillus Subtilis.
Proteus.
Streptococcus Pyogenes.
Bacillus of Swine Fever.
Bacillus Megatherium.

Young cultivations (12 hours) upon agar were used for inoculation.

The table appended shows the results :—

(+ signifies that growth has occurred; — signifies no growth.)

Antiseptic Properties of Electrozone.

BACTERIUM TESTED.	CONTROL.	1 IN 5.
Bacillus Coli Com.	+	—
Bacillus Pyocyaneus	+	—
Staphylococcus Pyog. aureus	+	—
Bacillus Typhosus	+	—
Vibrio Cholera	+	—
Bacillus Anthracis	+	—
Bacillus of Fowl Cholera	+	—
Bacillus Diphtheria	+	—
Bacillus Subtilis	+	—
Proteus Vulgaris	+	—
Streptococcus Pyogenes	+	—
Bacillus Prodigiosus	+	—
Bacillus of Swine Fever	+	—
Pseudo-Diphtheria Bacillus	+	—
Bacillus Megatherium	+	—

[It will be seen that none of the Bacteria tested grew in nutrient broth containing one part of Electrozone in every five parts of the medium. The result thus depicted can only be fully realized when it is borne in mind that Electrozone is so cheap an article, and so non-poisonous that the pure, and not the diluted, liquid might, if necessary, be employed at any time.]

The second series of experiments was made to determine the disinfecting properties of Electrozone ; *i.e.*, the strength of solution required to destroy bacteria when acting for a known time.

Experiments with Sporeless Bacteria.

The following Bacteria were tested :—

Bacillus Coli Com.	Staphylococcus Pyog. aureus.
Bacillus Typhosus.	Bacillus Pyocyaneus.
Bacillus Diphtheria.	

The method employed was to make an emulsion in sterile broth of the bacteria from young agar cultures and to add Electrozone in known proportions.

After acting for a measured time, inoculations were made from the mixture into fresh broth tubes. These tubes were placed in an incubator, and, after a sufficient time, were examined microscopically to see if growth had occurred.

The table appended gives the results. + signifies growth ; — signifies no growth.

[It will be seen that Electrozone, in the strength of one part in four, destroyed all the sporeless bacteria tested when acting for one minute.]

Disinfecting Properties of Electrozone upon Sporeless Bacteria.

	Proportion of Electrozone 1 to 4.		Proportion of Electrozone 1 to 6.	
BACTERIUM TESTED.	Acting 1 min.	Acting 1 hour.	Acting 1 min.	Acting 1 hour.
Bacillus Coli Com.	—	—	+	—
Bacillus Typhosus	—	—	...	...
Bacillus Diphtheria	—	—	...	...
Staphylococcus Pyogenes aureus	—	—	—	—
Bacillus Pyocyaneus	—	—	—	—

Control experiments were made in each instance.

Here, again, it will be noted that the medium was strongly diluted, and yet the result was of a successful character. Practically, in every case in the first-quoted table, and in the table just given, in every case save one, when, in a proportion of one to six, the Bacillus Coli was not destroyed in one minute, the proportion of success was 100 per cent. It is not obtained with carbolic acid and per-chloride of mercury, except when they are used at a poisonous or even corrosive strength. As compared with these so-called germ destroyers, Electrozone is a perfect antiseptic. This is borne out by American experience. In the City Hospital, which is the largest in Boston ; in the Wills Hospital, in the City of Philadelphia ; in the Home of Consumptives, in Philadelphia ; in the Post Graduate College, in the City of New York ; in the Laboratory of Dr. Abbott, in Philadelphia ; in the Chemical Laboratory of the College of the City of New York ; in the Laboratory of the Board of Health, in Salem, Mass. ; in the Dental College, in Augustus, Ga. ; in the Hahnemann Hospital of New York City ; in the Pathological Society, New York City ; in the Massachusetts College of Pharmacy, in Boston ; and in the Chemical Department of the New York Board of Health,—*Electrozone is pronounced to be by far a better antiseptic than bi-chloride of mercury.* From the Boston City Hospital a report is forwarded by Dr. Young, who is the head doctor of that institution, in which he states : "A lacerated hand was treated with Electrozone as an antiseptic and was cured in nine days, whereas it would have taken six weeks or more to do the same work with bi-chloride of mercury."

Dr. Leplace, of the Medico-Chirurgical Society of Philadelphia, and Dr. Abbott, formerly Bacteriologist to the Johns Hopkins College, at present Bacteriologist of the University of Pennsylvania, and Dr. Lattimore of Reynold's Laboratory, of the University of Rochester, claim that *carbolic acid and bi-chloride of mercury are not true disinfectants.*

Concerning the action of Electrozone on the Bacillus of Cholera, in 1893, during the cholera epidemic, the New York Board of Health caused a series of tests to be made regarding the value of Electrozone as a disinfectant. The Bacteriologist of the New York Board of Health, in company with another leading Bacteriologist, after extended experiments with different strengths of Electrozone, found that in every test made, without a single exception, where a 10 per cent. or stronger solution was used they killed the cholera germ in thirty seconds.

Attention may be specially drawn to an official Bacteriological investigation, undertaken by the City of New York Board of Health, whereby it was shown that

THE ANTHRAX SPORE (THE MOST RESISTANT OF ALL KNOWN GERMS) WAS DESTROYED IN THREE MINUTES.

How thorough and elaborate the series of tests of Electrozone as a bactericide were may be judged from the following extracts *:—

EXPERIMENTAL WORK ON DISINFECTION.

A number of experiments have been performed :

* * * * * *

Series of Experiments to Determine the Germicidal Value of Electrozone.

A report of the preliminary experiments detailed below was presented to the Board on November 15. These experiments were performed under my direction or at my suggestion by Mr. Alfred L. Beebe in the Carnegie Laboratory Dr. William H. Park in the Laboratory of the College of Physicians and Surgeons, and Dr. George P. Biggs in the Laboratory of the New York Hospital, with also some data by Dr. Edward K. Dunham and Dr. John H. Huddleston.

---

* Annual Report, Health Department, City of New York, 1892, pp. 190-193.

The salt-water used in these experiments was furnished by Mr. A. E. Woolf, and was said to have been prepared from water taken at the foot of Rector street, North river, by the passage through it of an electric current.

I.

The following experiments to determine the germicidal value of the solution were performed by Mr. Beebe :—

In the first series the water used was furnished in glass and was marked as follows : "Taken foot of Rector Street, N. R. Density 2° B. Charged in 3 gallon lot, October 17, 1892." This water was protected from the light and kept closed when not in use during the course of experiments. Cultures containing anthrax spores and staphylococcus pyogenes aureus were prepared, and in these were dipped small sterilized disks of linen, about 8 mm. in diameter, which were subsequently dried in a desiccator over sulphuric acid. The dried disks were then immersed for varying lengths of time in various dilutions of the liquid to be tested, as noted below, and also in distilled water as a control. They were then transferred to nutrient gelatine tubes, and the growth, if any, of the specific micro-organisms noted. In order to observe the inhibiting effect, if any, of the amount of liquid transferred by the disks to the nutrient gelatine, a second set of controls was prepared, by immersing a sterile disk in each of the various dilutions of the liquid tested, and transferring this, together with a "culture" disk prepared as previously described, to nutrient gelatine tube.

NOTES.—Time from receipt of sample tested until first opened and used, forty-seven hours.

Distilled water used in making dilutions of samples tested.

Conclusions.

1st.—Under the conditions outlined on preceding page, the solution tested **is a germicide for anthrax spores** :—

(a) By one hour's exposure to a 10 per cent. solution.
(b) By ten minutes' exposure to a solution of full strength.

It is a germicide for staphylococcus pyogenes aureus :—

(a) By one hour's exposure to a 10 per cent. solution.
(b) By ten minutes' exposure to a 50 per cent. solution.

2nd.—In all cases, save in the exposure of anthrax for one minute to a 10 per cent. solution, the liquid exercised a marked inhibiting effect on the growth of the micro-organisms employed.

II.

A series of experiments was performed by Dr. William Hallock Park, in the Laboratory of the College of Physicians and Surgeons, under the general direction of Dr. T. Mitchell Prudden. The following is a brief summary of these experiments :—

The materials used were fluid typhoid fœces, common hard fœces and mixed bacteria. To each of these were added the spirilla of cholera Asiatica. The fœces contained very numerous bacilli coli com.

To a fluid culture of mixed bacteria, three times the amount of the electrolized salt-water was added, and the mixture was well shaken. Gelatine plate cultures were made after 10, 20, 30, and 40 minutes. The first three plates contained diminishing numbers of colonies, the last was sterile.

To liquid fœces of typhoid with cholera spirilla added, ten times the amount of salt solution was added. Plates made after thirty minutes' exposure remained sterile.

No cholera colonies developed in any of the plates exposed ten minutes or over. Control cultures contained very many cholera colonies.

A few observations were made by Dr. Edward K. Dunham, on the spirillum of cholera Asiatica. Electrolized sea-water (Electrozone) was mixed in equal quantities with bouillon cultures of cholera Asiatica, and after an exposure of 30 seconds, Esmarch roll-tube cultures were made from the mixture. Appropriate control cultures were also prepared. In none of the tubes did any cholera colonies develop, although large numbers were present in the controls.

BACTERIA IN DRINKING=WATER.

Another official endorsement, like many of those already given, entirely unsolicited, may be here quoted. It is as follows :—

HEALTH DEPARTMENT,
301, MOTT STREET, NEW YORK CITY,
OFFICE OF THE CHEMIST. *September* 14*th*, 1893.

CYRUS EDSON, M.D.,
Commissioner.

SIR,—I have the honour to make the following preliminary report as to the result of purifying water by means of "Electrozone," at Brewster's, Putnam Co., New York. Tonnetta Brook was selected as containing a very much larger amount of impurities than the Croton River.

The analyses have been of two kinds ; first, Chemical ; second, Bacteriological. The "Electrozone" was sprayed into the Tonnetta Brook at a point about 300 feet from its mouth. "Electrozone" equivalent to one part of the contained Hypochlorite to 100,000 parts of water was used in the experiments.

First, Chemical. The comparison of the results of the analyses of the samples taken before and after the addition of the "Electrozone," and on different days, and before and after heavy rains, shows that the nitrogeneous organic matter was very largely oxidized. That is, the greater part of the free and albuminous ammonia was transformed into nitrates. All of the nitrites were oxidized to nitrates.

These results showed that the action of the "Electrozone" is to render the water, which was contaminated before treatment, pure and suitable for all domestic uses.

Second, Bacteriological. Samples were taken at the same time and place as those for the Chemical analyses, and estimated as to the number of Bacteria contained before and after the mixing of the "Electrozone," with the following results :—

Number of Bacteria per C.C. in samples taken :*

Before treatment,	32,600	After treatment,	8
"	22,000	"	42
"	2,333	"	12
"	4,134	"	0
"	7,000	"	0

In other words the water seems to be rendered sterile by the addition of "Electrozone."

The germicidal effect of this weak solution of Hypochlorite of Soda, "Electrozone," is so marked, and so much greater than has generally been supposed, the process of purifying water in this way so novel, and the importance to the community so great, that, while every care was taken in making the Bacteriological tests, yet, a verification would, in my opinion, be very desirable. I respectfully recommend that a specialist in Bacteriology be employed to go over the same ground that I have been over, so that my results can be checked and verified.

---

* This Table will be found quoted on a subsequent page.

Respectfully submitted,

(Signed) EDWARD A. MARTIN,

Chemist.

TYPHOID BACILLI AND DIPHTHERIA BACILLI DESTROYED IN ONE MINUTE.

The experiments of 1892 and 1893 are sustained by fresh experiments made in 1895 in one of the most conservative of American medical centres—the Massachusetts School of Pharmacy to the Boston City Hospital. Mr. G. R. Tucker, Professor of Chemistry and Bacteriology at the institution just mentioned, reporting on Nov. 20th, 1895, said :—

I have the honour to submit the result of my tests with Electrozone carried out to determine its disinfecting power upon pure cultures of Anthrax spores, the bacillus of Typhoid Fever, and the bacillus of Diphtheria. Also the results obtained with the same organisms by the use of Carbolic Acid, 2½% and with Corrosive Sublimate, 1=2000.

The comparative efficiency of Electrozone, Carbolic Acid, and Corrosive Sublimate, as shown by their action upon the organisms specified, is as follows :—

" **Electrozone**	Killed Anthrax Spores in three minutes.
" Corrosive Sublimate " (1=2000) ...	Killed Anthrax Spores in 18 minutes.
" Carbolic Acid, 2½% ...	Did not kill Anthrax Spores in 3 days.
" **Electrozone**	Killed Bacillus Typhi in one minute.
" Corrosive Sublimate (1=2000) ...	Killed Bacillus Typhi in 1 minute.
" Carbolic Acid, 2½% ...	Killed Bacillus Typhi in 1 minute.
" **Electrozone**	Killed Bacillus Diphtheria in one minute.
" Corrosive Sublimate (1=2000) ...	Killed Bacillus Diphtheria in 1 minute.
" Carbolic Acid, 2½% ...	Killed Bacillus Diphtheria in 1 minute.

"The results show Electrozone to be a more powerful disinfectant than Carbolic acid 2½%, or Corrosive Sublimate, 1=2000, since it kills the most resistant of all organisms (Anthrax spores) in a period of time not exceeding three minutes.

"In actual practice, however, the difference in efficiency between Electrozone and Corrosive Sublimate would probably be very much greater than is shown by the laboratory tests, owing to the fact that Corrosive Sublimate forms an inert insoluble precipitate with albuminous matter, which not only diminishes the strength of the disinfectant, but encloses the organisms to be killed in an impervious envelope, and thus removes them from the area of action of the disinfectant.

"In the above test the amount of albuminous matter introduced into the disinfectant was insignificant, and, therefore, the difference in efficiency between Electrozone and Corrosive Sublimate would be less pronounced than under the conditions met with in practical disinfection."

It is thus made evident that, as a bactericide, Electrozone will, HARMLESSLY, accomplish everything that otherwise can only be accomplished by the use of compounds which, because of their deadly poisonous characteristics, cannot be largely employed in combatting and relieving human suffering. Without exaggeration, without forcing the facts in any degree, it may be asserted that, when Electrozone comes into habitual use by the profession for the treatment of human beings and animals, the death rate from Diphtheria, Typhoid, Cholera, Swine Fever, and analogous diseases in sheep and cattle will, in uncomplicated cases, be very materially diminished.

CHAPTER II.

PURIFICATION OF DRINKING-WATER AND RUNNING STREAMS.

A free use of Electrozone would solve what is, perhaps, the greatest problem occupying the attention of County Councils, Town Councils, Local Boards of Health, and other public bodies. In respect to the purification of drinking-water, of running streams fouled by sewage and emanations from manufactories, of sewage effluents, and the like, what is now, at GREAT COST AND MOST IMPERFECTLY, accomplished by the use of various chemicals and the construction of costly filtering works—if, indeed, these means can be said to accomplish what is desired—can, at MODERATE COST, AND PERFECTLY be done by a free use of Electrozone.

Here is an example dealing with the water-supply of a great city :—

MR. T. C. MARTIN,

EDITOR OF THE *Electrical Engineer*, NEW YORK, IN HIS ISSUE OF THE 8TH AUGUST, 1894, WRITES :—

" Just a year ago the attention of the public of New York City was arrested by the bad condition of the drinking-water, and by the attempts made to purify it. The horrible experience of Hamburg with cholera had shown that a severe epidemic could very quickly be created by bad water, and while elaborate instructions were issued as to boiling the water, etc., it was seen that the better way was, if possible, to deliver the water pure, and to sterilize any sewage that might find its way into the supply. Hence it came about that at Brewsters, N. Y., whose sewage drained into a marsh from which part of the New York City water-supply was derived, a determined effort was made to render the pollution innocuous. The New York City medical authorities with Dr. Cyrus Edson at their head, agitated the subject, but did not find many persons willing to grapple with the problem on the rough and ready, yet adequate, plan necessary to successful dealing with city drinking-water, in such huge volume. At this juncture, Mr. Albert E. Woolf, who had already made some interesting inventions in electricity, offered to undertake the task with a purifying liquid which he called Electrozone, and which he obtained by the electrolytic treatment of sea-water or salt-water. The electro-chemical action, broadly stated, was that of converting the sea-water chlorides, bromides, etc., into hypochlorites and hypobromites; and such solutions of sodium had very little mercy for organic matter with which they might be brought in contact. One portion of the chlorine in the hypochlorite replaced part or all of the hydrogen in the organic matter; and another part pounced on the liberated hydrogen, and ozone was produced, which in turn had its due effect on the organic matter. In other words, the process is at once that of perfect decomposition and disinfection, sterilizing polluted water or purifying decayed or dead organic substances. The knowledge as to this effect of chlorine was not altogether new, but Mr. Woolf was the first to produce the disinfectant he dubbed "Electrozone," and to give it to the public as something of the utmost value in all sanitation."

Be this as it may, Mr. Woolf last summer afforded a very striking demonstration at Brewsters of what Electrozone could do, proving to every impartial and disinterested observer that electricity in this way could become a mighty agent for the purification of water, the prevention of zymotic diseases, the disinfection of sewage, the sterilization of garbage, and for other sanitary work. It may be mentioned here that, with the help of a small plant, Electrozone was sprayed into Tonnetta Brook, near Brewsters, at the rate of about one part of the contained hypochlorite to 100,000 parts of water. The results of this treatment were reported to Commissioner Edson last September, by Dr. E. A. Martin, chemist of the Health Department, in a careful discussion of the whole subject, from both the chemical and the bacteriological standpoints. He stated that after the treatment, the nitrogeneous organic matter was very largely oxidized. The greater part of the free and albuminous ammonia was transformed into nitrates, and all the nitrites were oxidized to nitrates. The bacteriological analysis yielded the following significant figures :—

Number of Bacteria per c. c. in Samples taken.*

BEFORE TREATMENT.	AFTER TREATMENT.
32,600	8
22,000	42
2,333	12
4,134	0
7,000	0

Dr. Martin was so impressed with these figures that he requested that they be checked and verified by a bacteriological specialist. He also made a test of Brewsters sewage treated by the electric current and Woolf electrozonic method, and by a series of 15 tests found that sewage which contained about 10,000,000 bacteria per c. c. was perfectly sterile after an hour and thirty minutes.

---

* Already quoted, p. 32.

Since that time the sewage of Brewsters has been steadily treated by the Woolf process, and Dr. J. G. Wood, the local Health Officer, reports that the village itself has never before been in such a healthful condition, adding: "I have frequently visited the dykes into which the sewage empties under treatment with the electrical disinfectant, and have always found them to be deodorized and disinfected and in a condition positively not detrimental to health." Death had visited the Doctor's own family in one of the typhoid epidemics to which Brewsters had been liable, but he bears witness that since the use of the process, scarlet fever and malarial fevers have all been checked. Mr. Martin concludes :—"This may explain the fact that in New York City *the death rates* from diarrhœal diseases and typhoid fever *have markedly fallen off* since Brewsters was thus cleansed ; and the inference is a fair one that electricity has been one prime agent in effecting this better condition of affairs. The average death rates from these diseases in the ten years prior to 1893 were 2·18 and 0·26, whereas for 1893, in spite of the increased population, the rates were only 1·17 and 0·20."

The process whereby running streams, such rivers as the Thames, the Trent, the Avon, the Liffey, not to mention a hundred others, large and small, in the United Kingdom, as well as the Manchester Ship Canal, can be completely sterilized and rendered pure, is simple and comparatively inexpensive ; when thoroughly understood and appreciated by the respective county and local authorities, the process cannot fail of widespread adoption. Dr. Cyrus Edson's prophecy, based on "its efficiency, cheapness, and absolute safety," that **Electrozone,** being **"the best practical disinfectant in the world,"**

"ITS USE WILL BECOME UNIVERSAL,"

will be fulfilled. How great the resulting gain would be to the robustness and vitality of the people of these realms if our polluted water supplies and running streams were made once more sweet and clean, can never be fully set forth.

CHAPTER III.

ELECTROZONE AS A DEODORIZER OF SEWAGE AND GARBAGE, AND AS A HOUSEHOLD NECESSITY.

Reports of the beneficial effects of the employment of Electrozone in the deodorization of sewage and garbage must, as in regard to water purification already dealt with, be largely drawn from American experience for the present, though corroborative proof is rapidly accumulating from the first plants installed in this country (see pages 57 and 58). In the United States the discovery has been applied on a large scale. "Under Canal Street, in New York, is an old and very large sewer. It empties into the North River, and the heavy matter of course remains in the basin at the foot of the street. On one side of this basin is a public dump, where the street sweepings and garbage and other refuse matter are deposited before being taken to sea. This basin, from the two sources mentioned, became one of the foulest places imaginable. The water was thick and heavy, and bubbles of sewer gas were always on the surface. The stench was horrible, and seemed almost to fracture the olfactory nerves." This was the place selected to disinfect with Electrozone. A simple plant was erected there, and the water for it pumped from far out in the river, where it was comparatively pure. The sea-water was electrolized and then sprayed into the filthy basin. There was an instant change. The water became almost transparent, and instead of the nauseating stench in the air was the odour of ozone and chlorine.

A larger and more important test, however, was that of deodorizing the garbage dumped on the southern foreshore of Riker's Island, East River, New York Harbour. From a narrative describing this truly Herculean Labour, the cleansing of a worse than Augean stable, by Mr. T. Commerford Martin, in the *Electrical Engineer* (N. Y.) the following particulars appear :—

We need hardly wonder that Dr. Edson spoke of the new electro-disinfectant as "one of the greatest discoveries from a sanitary standpoint ever made." It was either this or a great, big, humbug. There could be no question that if Mr. Woolf had hit upon an agent so powerful as that described, he had entitled himself to a high place in the ranks of great electrical inventors, for it was evident that its uses would be many and various. But it required a colossal nerve to undertake the next task that Mr. Woolf tackled,—none other than the disinfection of Riker's Island. This recent addition to New York's pleasure resorts is situated in the East River and is the outermost of the islands and clumps of rock that the authorities have reclaimed and utilized as sites for prisons, asylums, hospitals, etc. It lies northeasterly from Port Morris about three quarters of a mile, and a little south of Westchester county. It was bought by the city about two years ago and is about 137 acres in normal extent. At the southern end of this island and projecting out toward the channel frequented by Sound-going craft was constructed a strong cribwork of piles and broken stone, so that a vast inner space was gained from the water, to be filled in. Last Christmas, as a happy and fitting time, the Street Cleaning Department began to dump garbage there, it being evidently much more handy and convenient to do so than to tow the stuff out into the bleak and stormy Atlantic. Now, it is estimated that New York furnishes over 8,000 cubic yards of choice garbage every day, in the following proportions: ashes 30 per cent.; paper, 20 per cent.; street sweepings, 20 per cent.; kitchen refuse, 20 per cent.; wood, 10 per cent. A large part of the garbage continued to go thither, so that by midsummer, over 1,000,000 cubic yards had accumulated within the cribwork. While the days were cold, this was a matter of indifference to the neighbourhood, but by May and June, the whole mass was in a condition that might well be called infernal; in fact, fermentation went so far that at many points, smoke curled up, and an egg could be cooked anywhere, a few inches down. The stench was awful. I have been informed that it was nauseating three miles away, on the open waters of the Sound; while residents at College Point, nearly two miles off, and elsewhere, became loud in their outcry. At last the dumping of the garbage was stopped, but not before Mr. Woolf, with a serene confidence in his ability to abate the nuisance, came forward and offered to disinfect the whole island over whose artificial southern shore some 30 acres of vile refuse now lay massed to a height of 10 or 12 feet, with here and there a pool of intensely black sludge, the odour of which was a concentration of all the bad smells the world has known. Mr. Woolf stepped in none too soon, for the island would ere long have heaved itself bodily out of its crib or have given birth to monsters equal in deadliness and vileness to any that the primeval slime ever saw.

The task of reducing Riker's Island to a sanitary condition began on June 29 last, when, urged forward by the anxious authorities, Mr. Woolf ran alongside the crib a barge on which he had installed a modest Electrozone plant capable of delivering about 4,000 gallons per hour of that liquid. All around, the river waters were black and noxious, the tides doing little to improve things; but Mr. Woolf, imitating the Bismarckian policy of frying Paris in its own fat, took that water into his tanks to be purified and showered back on the stinking, smoking, fermenting mass from which it slowly oozed.

My attention being caught by the publication of the complaints from citizens in the Twenty-third and Twenty-fourth Wards, I called on Mr. Woolf a few weeks ago and asked him whether his plant was at work and whether it had accomplished anything. He invited me immediately to go and see, or smell, for myself, and as I betrayed some reluctance to undergo the ordeal he pledged his word that I would be most agreeably disappointed. I therefore accompanied him on July 26, going in the morning so as to find the Island at low tide, with all its wickedness bare, and with all its potentiality of smell fully developed by a sun which during July went over 90° no fewer than eighteen days of the month. There also happened to be an easterly wind, so that standing on the cribwork or approaching the Island from the New York shore, one could enjoy the full benefit of the effluvia of the whole rotten mass. Under such conditions, I may state that it was not until we arrived within one or two hundred feet of the Island that any odour was perceptible, and that only on one face, due, apparently, to the sewage of part of the falling tide through the lowest strata of the mass still untreated by the disinfectant. The odour was strongly that of sulphuretted hydrogen and was certainly highly undesirable as a part of human nature's daily atmosphere. Landed on the Island, however, I found the smell there anything but pungent, and the sober truth of this statement may be inferred from the fact that I spent more than two hours right on the garbage walking about wherever it was firm under foot, and watching closely the half-dozen men who were playing on it with hose, just in the same way as the remains of a great fire are played on. Four thousand gallons per hour seemed a good deal of liquid, but when divided into six or seven streams, hundreds of feet apart, it gave the impression of a very small quantity, in relation to the mass to be brought under subjection. Yet, if the test of eye and nose goes for anything, Electrozone has wrought wonders at Riker's Island. I am told that when men went there under the old conditions, they were frequently nauseated, but I found those on the barge and on the crib as busy and nonchalant as possible ; while another gang at the upper end placing a thin face of earth on some of the garbage, were equally unconcerned and indifferent. They were all quite as eager as myself for a hearty lunch at noontime. Moreover, I saw some twenty or thirty excursion boats and barges go by. Until recently, the arrival of such craft off Riker's was the signal for an outburst on board of them of derisive groans and curses, and for a general bad quarter of an hour ; but now I saw the ships go by without the slightest cessation of the singing and dancing aboard, and without giving the slightest indication that the Island existed. Yet the brisk morning breeze was right towards them from the vast mounds of garbage on which our party stood. Later on I went over to North Brothers Island, about one-eighth of a mile away, and interviewed Dr. S. Dana Hubbard, Junr., the courteous medical superintendent. The wind was then setting directly over us from Riker's, but although we walked all around North Brothers, no smell was observable anywhere. Dr. Hubbard informed me that the change accomplished in this respect in a few weeks was very remarkable. He also told me that before Electrozone was used they had found it impossible on North Brothers to keep metal clean, and the brass work on the "Franklin Edson" steam tender was always turning black. I saw for myself afterwards that there was now no trouble in keeping it bright and shiny, man-of-war fashion.

I would not be misunderstood, however, as to just what I found ; and I think that the mere literal, unvarnished, statement of the facts is enough to show that some remarkable work has been done. Odour there still was when

I visited the Island, and it was evident that Mr. Woolf had considerable work cut out ; but if he has not regenerated the place by Fall I shall be greatly mistaken. As far as I could determine, the Electrozone had done its duty down to a depth of at least two feet. I had the ground dug up in forty or fifty places with a fork, and at that depth the garbage was almost invariably deodorized. Below that, the liquid had not yet penetrated except in a few places, but a change is being made in the treatment. Now that the surface is purified, deep holes are being dug and into these the Electrozone is poured, so that it will soak and permeate in every direction and thus reach the underlying strata otherwise difficult to get at. But there was no question of the fact that over the surface of the whole thirty acres, in a brief three weeks, with his half-dozen little squirts, Mr. Woolf had brought death to every foul germ, gas and odour ; and that the work of purifying infiltration is steadily and successfully going on. A curious feature about the garbage that I had the honour of interviewing closely with my nose was that so far from being putrid or stale it had the look of being touched by a light white frost, and often its breath was that which comes from a damp, cool, empty cellar—an earthy flavour that would indicate anything but organic decomposition. This bleaching effect need not surprise us in view of the abundant creation of ozone.

Another feature of the work that impressed me was the extraordinary quick action of the liquid on the stagnant, stygian pools that had formed inside the crib, beyond the lines of dumping. To these marshes the tide could penetrate, but its ebb simply sucked so much black filth out of the rotting mounds, to lie effervescing under the fierce sun ; and the pools thus formed were the least sweet portion of the island. But, nothing daunted, Mr. Woolf has sluiced them with Electrozone, and most of them are already harmless. I saw one such pocket of recent formation treated in this manner. It had been dammed across, and had become oozy, and the smell was very bad. Mr. Woolf first sampled it for us in several of the broken cups and saucers that lay around like sea shells for multitude, so that we had no doubt as to its virulence; and we could see it all a-bubble with sulphuretted hydrogen. A line of hose was then run out to the place and in a few seconds the evil-looking scum had gone for ever. In ten or fifteen minutes the vile odour was sensibly diminished, and probably by this time that pool, in the very heart of the grim island, is infinitely sweeter than the ordinary city sewers, and certainly far easier to live alongside than such a cloaca as that at West Forty-second Street or others further uptown.

The Island has, I understand, accommodation still for some 10,000,000 cubic yards of garbage. Whether it will receive that quantity or not, I do not know. The complaints from the sea-front of New York as to garbage floating around are likely to put a decided check on further dumping there except with heavy boats that can go right out for miles; and even then it seems a pity to throw away that which has made the fortune of many a "Golden Dustman." The use of destructors is being freely discussed, and frequent reference is made to their successful use in Europe. Such plans require costly apparatus of great capacity, and the same is true of the plan tried at St. Louis and some other places of treating the garbage with steam under high pressure, and with naphtha: or in kindred ways. One cannot but wish success to all such efforts, but it does seem that the miraculous work done by Electrozone suggests a further and larger application of it in garbage disposal. There are seventeen garbage dumps in New York city, and I don't quite see why the garbage should not be Electrozoned there as well as, or instead of, at its place of final deposit. Not one of these dumps is a bed of violets, but with the garbage thus treated as quickly as it arrives from the streets, a nuisance would be abated, and the scows on their way later to the final repositories would attract as little notice as if they carried bricks or lumber.

Mr. Martin concludes thus :—

" I am glad to quote in support of my own statements as to what I found at Riker's Island, the testimony of Dr. A. L. Metz, M.D., chemist of the city of New Orleans and of the Louisiana State Board of Health. After his visit to the Island, he said : * ' In every instance I found it completely disinfected ; there was no active putrefaction going on, and, as a consequence, the noxious gases and odours so much complained of were not perceptible on the grounds.' "

LAY INVESTIGATION.

An English gentleman visited Riker's Island in the third week of September, 1895. He found a complete absence of offensive odour throughout the whole extent of the addition to the Island. Further, he found the Electrozone applied more than twelve months before had penetrated three feet below the surface, causing complete disinfection, while tomatoes, melons, and other fruits, self-sown, were found to be growing abundantly. The *New York Herald* (September, 1895) asserted that enough vegetables had been grown on the disinfected area to supply the wants of all the City institutions—hospitals and asylums of every kind.

SEWAGE PURIFICATION.

An article on " Sewage Purification" in which various methods of deodorizing sewage were contrasted and compared, was published in the *Engineering Magazine*, for October, 1895.† The writer, Mr. W. L. Hedenberg, a

---

* *New York Herald*, July 25, 1894.

† Published at Salisbury Court, Fleet Street, London, E.C.

Sanitary Engineer, thus refers to the Electrolytic Process of Disinfecting Sewage:

"About a year ago the Woolf system was installed at Danbury, Conn., for the purification of the sewage. The disinfectant is generated in a vat situated near and above a tank through which the sewage is made to flow. The Electrozone is allowed to run into the tank by gravity, the flow being regulated by a valve. The disinfectant and sewage are thoroughly mixed by an agitator in the tank, and, as the sewage rises, it overflows into a line of pipe which discharges into the rivers. With a population of 16,552, the cost per inhabitant per year amounts to 27 cents (English 1s. 1½d.).

"The results obtained so far have been good according to analyses; complaints have been made, however, by persons along the river, owing to the fact that the heavy part of the sewage is allowed to find its way into the stream. This has been remedied by adding a settling tank, and the use of screens.

"The costs of the various methods per inhabitant per year, are as follows:

	Cents.	English.	
		s.	d.
Woolf System, Danbury, Conn.........	27	1	1½
Hermite System, Nice (abandoned)...	48	2	0
Chemical and Land, East Orange, N.J.	71·7	3	0
Land Filtration, S. Framingham, Mass.	83·3	3	4½
Chemical, Chautauqua, N.Y...............	57·4	2	4½

Recently—in February, 1896—an inspection or the Brewsters, (N.Y.) and Danbury, (Conn.) plants was made by an English Electrical Engineer (W. P. Digby), whose report is as follows :

"*Brewsters* : this township of about 5,000 inhabitants is situated on the Tonnetta Brook, from which stream a large portion of the New York drinking-water is drawn.

All the sewage from Brewsters runs *direct* into this stream, as also does the drainage from several cattle pens, Brewsters being a centre of the canned milk industry. The result was that typhoid and other fevers ravaged Brewsters time after time, and house property had changed hands at from 20 °/₀ to 65 °/₀ below the present market value. The amount of bacteria in the drinking-water as also epidemics of typhoid fever in the districts supplied, drew the attention of the New York Board of Health, and an Electrozone plant was installed.

When I visited Brewsters, on January 16th, 1896, I found the plant running very satisfactorily. Before the sewage ran into the stream, iron grids kept back the thicker fœcal matter. These were cleared occasionally, the sludge being sold to farmers. Then the Electrozone was run in at a strength of one part of hypochlorite to 100,000 parts of the sewage, which then ran through further dykes and through another grid into the Tonnetta Brook.

Here, a further quantity of Electrozone was sprayed in to sterilize the sewage brought down from villages higher up in the hills, and, after running several miles, the water was taken down to the reservoirs.

The result of this installation was that Brewsters property regained its normal market value, and an immediate fall in the death rate was due to the cessation of typhoid and other fevers, both in Brewsters and New York.

During my stay I saw some of the local property owners, and the editor of the district newspaper, and nowhere heard an adverse criticism of the system or its results, but on the other hand unstinted praise.

Danbury City, (*Conn.*) I visited the Electrozone plant at this place, with Mr. Hintze, the Sewage Commissioner of Elgin, (Ill.) Danbury city has just over 20,000 inhabitants and is, in most respects, a typical American town, with trolley tram lines and electric light.

The main sewer runs under the dynamo room into a large well ; its contents are there mixed with Electrozone while the fœcal matter is broken up by a large disintegrator. The sewage, having thus been attacked and sterilized by Electrozone, flows through a fine mesh into about 200 yards of piping and thence to the river. Mr. Burchard, the city engineer, told me that Electrozone absolutely sterilized the sewage, and Judge Brewster, Commissioner to the city, informed me that he was highly pleased with the result. They both pointed out the great saving made each year by this method, in addition to the small extent of ground required as compared with filter beds.

Philadelphia, (*Pa.*) The city corporation erected a dynamo and other material required for the manufacture of Electrozone. Part of this Electrozone was run into the main sewer, on its way attacking and destroying all germ life before the sewage flowed into the Delaware river. The remainder was sprinkled along the most squalid streets from water carts and poured into vaults and cess-pools in certain districts where no sewers were laid down.

During my short stay in the States I saw sufficient of the surprising powers of Electrozone to convince me of its surpassing merits as a bactericide."

FURTHER SCIENTIFIC TESTIMONY ON THE APPLICATION OF ELECTRICITY TO THE SEWAGE PROBLEM.

Professor John W. Langley who has been conducting at the Case School of Applied Science, Cleveland, elaborate experiments on the application of electricity to the purification of sewage, at a meeting of the Cleveland Council of Sociology, read a paper giving the results of his experiments and investigations.

"The members of the public are quite familiar," said Professor Langley, "with the uses of electricity as a source of light and power, but they have not had their attention called to its uses as a chemical agent. This, too, is a growing field for its employment in electro-metallurgy and in the production of alkali. One of the newest and perhaps one of the most general interest is a proposition to utilize the decomposing power of electricity for the destruction of bacteria and noxious odours, particularly in that fluid which is pre-eminently rich in them—sewage."

Referring to the practical results that have already been accomplished, Professor Langley said, after making proper reference to the Brewsters plant and operations :

"In order to give a scientific basis on which to make estimates of the cost, I have made in the electrical laboratory of the Case School of Applied Science numerous experiments using an artificial sea-water, which practically represented the real article. Small decomposing tanks were made, after the pattern of the large ones, and the electrical energy used was carefully measured. From these it appears that six and thirty-seven-hundredths pounds of chlorine can be made every hour from one electrical horse-power. This quantity would purify over fourteen thousand gallons of sewage per day of ten hours. A hundred horse-power would therefore disinfect nearly a million and a half gallons in the same time.

"This method is one especially adapted to hospitals and large public buildings. The salt-water could be decomposed in moderate sized tanks, placed on each floor, and allowed to run into the drain system in small quantities, either automatically or by hand regulation. Thus this cleanly and practically inoffensive fluid would fill the traps of the various sinks and basins, and so disinfect all the material, while it was yet within the building, and before it reached the city sewers."

The above record, accompanied by a leading article of commendation and approval, appeared in *Electricity*, a weekly Electrical Journal, published on November 20, 1895. This journal, editorially, declares that :

" *The decomposition of sea-water by electrolysis, and the* " *application of the chlorine thus obtained, to the disinfection* " *of the sewage has,* WHEREVER TRIED, *demonstrated not* " *only the complete practicability of the method, but its economy,* " *commercially considered.*"

And, again, the same authority remarks : "The economy and simplicity of this method would, it seems, indicate its general application in the near future."

Non-scientific and non-professional journals and magazines are coming into line. The *Cosmopolitan Magazine*, for January, 1896, contains the following information and comments concerning

Electricity in Disinfection.

"How to treat garbage and sewage so as to render them inoffensive and innocuous has been a problem in every large town. Some have tried combustion, some forced draughts in tall chimneys to carry off offensive gases, some have built long conduits emptying into the sea at a distance from shore, and still others have tried chemical treatment. The objectionable products are all of them chemical and the proper treatment of them must therefore be chemical. Ozone, which is condensed oxygen, and may be produced by electrical discharges in the air, is a very energetic agent for such a purpose, and thunder-storms have long had the reputation of purifying the air. An electric current sent through the water decomposes it, and if there be substances dissolved in the water they are sometimes decomposed at the same time. It has been discovered that if sea-water be thus treated, the various salts of sodium, calcium, magnesium, etc., which are held in solution in it, are so changed as to become powerful deodorizers and disinfectants. They are converted by the current into what are chemically called hypochlorites, or substances which contain oxygen, but so loosely associated as to be easily separated if there be anything else with which it can combine. The solution, which has been called *Electrozone*, is therefore an oxidizing agent, and its efficacy depends upon that kind of a chemical action. A small quantity of this mixed with garbage, or sprinkled in unclean streets, acts promptly to decompose noxious gases and disease germs.

"It has already been adopted in Philadelphia, and as it is *safe*, *clean*, *efficient*, and *cheap*, it is likely to be widely used everywhere."

"Prof. A. E. DOLBEAR."

PRACTICAL USE OF ELECTROZONE IN PHILADELPHIA.

The reference to Philadelphia in the above citation may serve to introduce the following extract concerning the application of Electrozone to Street Disinfecting and other similar purposes in that city :—

The *Philadelphia Record*, Oct. 19th, 1895.

DISINFECTING BY ELECTRICITY.

ELECTROZONE.

"An exhaustive explanation, and an eminently satisfactory test, of the new disinfectant, Electrozone, was made before the Board of Health, the Medical Inspectors, and a number of prominent Physicians, yesterday afternoon, in the City Hall. The properties of this disinfectant were proved to the Board of Health some time ago, and the construction of a plant for its manufacture in the basement of the City Hall was authorized, although the Board placed itself under no responsibility for its final purchase. During two weeks' trial, everything claimed by the inventor was clearly proven, and yesterday Director Beitler accepted the plant.

" To celebrate this happy result of his efforts, Mr. Woolf gave a lecture on Electrozone, and made a number of interesting tests in the Board of Health room.

" This explanation was of interest to those scientifically inclined, but to the uninitiated the real wonders were revealed by the tests. The meeting adjourned to the basement, where a motor, supplied with electricity from the building, was sending a strong current through a big tub of salt-water. The water churned and bubbled under the action of the electricity, and that the commotion was to some purpose was shown by the action of the water on a piece of putrid meat. A. L. Dingee, of the Board of Health, sacrificed his nostrils to the cause of science, and, after one whiff, apprised the crowd that the meat was indeed decayed. Inventor Woolf held the meat in the tub for 30 seconds, and in that time all trace of odour was taken away. The disinfectant will be invaluable to the Board of Health because of its power, its cheapness, and the fact that almost any quantity can be manufactured on short notice."

ENGLISH DEMONSTRATIONS.

A Demonstration Plant has been erected at Maidenhead, within a close distance of London, to treat the effluent of the sewage of a population of 20,000.

The plant has been running with uninterrupted success, and the results obtained are testified to in the following report of a well-known and competent expert (T. J. Bokenham, M.R.C.S., L.R.C.P., L.S.A.) :—

"10, Devonshire Street,
"Portland Place, W.
"*April 24th*, 1896.

"I have pleasure in reporting to you the results of my investigations on the specimens of water collected. The results are very gratifying, as you will see from the following very brief statement :—

"1. Water from original effluent. Culture made from 1 c.c. After incubation found to be teeming with microbes and gelatine undergoing liquefaction.

"2. Similar specimen from experimental (treated) effluent. Culture made under identical conditions to those above mentioned. Gelatine remained clear and solid, and NO GROWTH WHATEVER IS OBSERVABLE AFTER FORTY-EIGHT HOURS' INCUBATION.*

---

* The capitals are employed by Dr. Bokenham.

"3. Second specimen from experimental (treated) effluent. One-tenth c.c. mixed with 10 c.c. of nutrient gelatine, and spread over the surface of a Petri plate. NO GROWTH WHATEVER OBSERVABLE AFTER FORTY-EIGHT HOURS' INCUBATION.*

"I must confess that I am absolutely astonished by the above results, which are superior even to any I have obtained with ordinary tap-water. I cannot, however, doubt their accuracy.

(Signed) "T. J. BOKENHAM."

CONFIRMATORY BACTERIOLOGICAL REPORT.

"Report on Samples collected at Electrozone Works, "Maidenhead, April 27th, 1896.

"10, Devonshire Street,
"Portland Place, W.

"These samples were collected by myself, and were taken under conditions of which no one but myself had any previous cognizance.

"Sample 1. From old effluent (before any treatment).

"Sample 2. From stream water used to prepare Electrozone.

"Sample 3. From vat of brine solution.

"Sample 4. From overflow of tub where effluent was being treated (with Electrozone).

"Sample 5. From bottom of tub where effluent was being treated (with Electrozone).

"Sample 6. From Electrozone tub.

---

[*] The capitals are employed by Dr. Bokenham.

"Each sample was collected in a sterilized Ehrlenmeyer flask, of 150 C.C. capacity, plugged with sterile wool and capped with india-rubber. When filled, the flasks were kept in ice until the time of their examination in my laboratories. This examination was made on the evening of the same day—gelatine plate-cultures being made with measured quantities of each sample. The plates were incubated for several hours at room temperature, after which they were examined for bacterial growths, such examination being made daily for four days. The results were as follows:—

"Sample 1. Growth very abundant—at least 50,000 microbes per C.C.

"Sample 2. Very numerous colonies after thirty-six hours' growth (both the above liquified after three days).

"Sample 3. Very numerous colonies made their appearance, but no liquefaction of the gelatine took place.

"Sample 4. REMAINED ABSOLUTELY STERILE.

"Sample 5. Remained sterile, save that on the fourth day two small patches of mould-fungus appeared at edge of plate, probably arising from air contamination.

"Sample 6. Not examined for bacteria, but kept as control.

"The foregoing results afford, therefore, an important confirmation of those embodied in my first report.

"There is absolutely no doubt in my mind that the Electrozone Process will be capable of doing on a large scale all it has been proved to do in the installation which has been the subject of my two reports.

Faithfully yours,

(Signed) “**T. J. BOKENHAM.**”
(M.R.C.S., L.R.C.P., L.S.A.)

To the British Electrozone Corporation, Ltd.,
May 11*th*, 1896.

The following official report has also been made upon the results secured at the Corporation's Maidenhead Demonstration Plant, indicating *pratically absolute* sterilization :—

THE CLINICAL RESEARCH ASSOCIATION, Ltd.
1, Southwark Street,
London Bridge, S.E.

“We have made an enumeration of the four samples of water sent us, and find that in samples marked ‘A’[*] and ‘B’[*] there were approximately between 50,000 and 60,000 bacteria per c.c.; in sample ‘C’[§] about 30,000 per c.c.; in sample ‘D’ were 8 to the c.c.”

Yours faithfully,
(Signed) **C. H. WELLS.**

April 20*th*, 1896.

---

[*] “A” and “B” were marked samples of sewage effluent *before* treatment by the Electrozone process.

[§] “C” was a marked sample of the water of the stream into which the effluent discharges *above* the point of outfall.

[‖] “D” was a marked sample of effluent *after* treatment by the Electrozone process.

CHAPTER IV

ELECTROZONE:

A REMEDY FOR HUMAN AND ANIMAL DISEASES AND FOR DOMESTIC AND HOUSEHOLD USE.

From a report made concerning the American Electrozone Company the following extracts are made :—

"Numerous letters and other communications indicating continued use for several years of Electrozone, were placed in my hands. Some of these were of a remarkable character, showing that *for almost every conceivable form of disease*,—certainly in respect to *all diseases of a germ origin*, whether cholera, diphtheria, &c., or of an inflammatory nature,—*Electrozone had not once failed to ensure recovery*. I ask particular attention to the letters from Dr. Solis Cohen, of Philadelphia. The last word I heard about Electrozone was from Mr. Brown, jun., a member of a New York firm of merchants, who spoke of a married sister, suffering from a large abscess in her side, dangerous to her life, which the doctors, failing to cure, had arranged to 'cut'; the operation, however, was not performed, but, instead, Electrozone was applied, and the patient had made a quick and satisfactory recovery, the abscess yielding to the treatment adopted. I, further, found that all the Directors of the Company, and others connected with the enterprise, were strong believers in the virtues of Electrozone and Meditrina, and had it in daily use for themselves and their families. In the *New York Herald*, of September 25th, the day on which I left New York, I saw it stated that all the diphtheria patients from a particular establishment where this disease had broken out, had been sent to the Willard Parker Hospital for treatment, and that all had recovered. Electrozone has been used in this Hospital since 1893.

YELLOW FEVER

"I had the pleasure of an accidental meeting, at the offices of the Company, with Dr. Abrisqueta, of New York, who is the representative of the Red Cross Society, through which Electrozone was introduced into the Spanish Army and Navy Hospitals in Cuba. He personally assured me that, of his own knowledge, Electrozone had been successful in curing yellow fever.

"Reference may also be made to my interview with the Bacteriologist of the Health Department of New York City, who made the tests at Brewsters. The gentleman I saw was Dr. Beebe, City Chemist Martin's chief assistant. Dr. Beebe not only confirmed what has been officially published, but favoured me with additional facts of an interesting character, giving fresh proofs of the beneficial nature of Electrozone.

GENERAL TESTIMONY.

Finally, on this point, attention may be called to an article which appeared in *The National Board of Health*

Magazine, a review of sanitary and therapeutic science,* for December, 1895. This article is in the following terms :

" This new disinfectant and antiseptic is proving to be a most valuable addition to the physician's resources as well as to the requirements of the sanitarian. Its properties as a germ destroyer are rapidly being recognized by the medical profession and many hospitals and public institutions have already adopted its use.

" The experiments made by Prof. Tucker, of the Massachusetts College of Pharmacy, with Electrozone, have opened the eyes of many who have heretofore been sceptical concerning the potency of this new disinfectant. Its harmless nature, being perfectly free from any injurious effects, causes it to be much sought after by those familiar with its properties.

* * * * * *

" Its deodorizing properties are unequalled and at the Post-Graduate Hospital and Medical School in New York, it is being used extensively in operations, where offensive odours are entirely removed and the operator performs his work without the objectionable feature heretofore existing in dissecting and operating rooms. Almost every hotel and public institution in New York has become aware of its value and is using it exclusively.

" **The number of cures effected with Electrozone and Meditrina** (which is Electrozone prepared for medicinal purposes) **is almost incredulous,** and the endorsements received from all sides where Electrozone has been used, would call for at least experimental work being done by those unfamiliar with the article.

---

* London : 12 and 16, Coleman Street, E.C.

"The Board of Health of the City of Philadelphia have erected a plant and make their Electrozone to use in large quantities in their streets, and the material is thoroughly endorsed by this body of experts.

"**The use of Electrozone in cases of diphtheria has proved it to be a most valuable cure for this plague,** and many of the leading physicians are using this remedy exclusively.

"The Home for Consumptives and the Wills Hospital in Philadelphia are using Electrozone in large quantities, both for disinfecting and for treatment of patients, and we think the time is not far distant when the value of this product of electricity will be recognized, and again this unknown power will be credited with having accomplished something by which the world will again be benefitted."

BLOOD POISONING.

A practical demonstration of the antiseptic properties of Electrozone, could not be better exhibited than in the case of Mr. Maxim, inventor of smokeless powder, brother of the inventor of the Maxim Gun. His hand was shattered by an explosion of dynamite. It was removed at the wrist. Gangrene and sloughing set in, resulting in blood-poisoning. Carbolic acid was employed as an antiseptic. The sloughing continued, and gangrene was not only unabated but on the increase, with the probability of the loss of the arm and endangering life. Mr. Maxim changed from Carbolic acid to Electrozone, and within forty-eight hours the sloughing had ceased and a healthy action initiated. This is one of hundreds of cases cited by competent authorities.

THROAT DISEASES.

25th March, 1896.

Gentlemen,—You kindly offered me another case of Meditrina to try—it is almost a fraud to say "try" for *I find it useful*. I have used it with success in the treatment of follicular tonsillitis, granular pharyngitis, as well as for relaxed sore throat and ulcerated mouth—as a spray; as a wet dressing for paronychia (whitlow) after incision in two cases with very good result; and in the later stage of the healing of a large sore on the foot caused by a scald; in this case too, it was very successful, rapidly cleaning the surface and stimulating the skin to repair. I have used it, too, as an antiseptic lotion and for several abraded and dirty-looking wounds, and found it exercise an excellent effect on them all.

Yours truly,

M.D. (Aberdeen).

A BRITISH GENERAL PRACTITIONER'S TESTIMONY.

London,
22nd October, 1895.

Gentlemen,—I have used Meditrina in granular pharyngitis, follicular pharyngitis, alcoholic pharyngitis, tonsillitis, abscesses and flatulent dyspepsia with the *most excellent results*. The more I use Meditrina the more I value it. I am sure it has a great future before it.

Yours truly,

M.D. (London).

A CURE FOR BLOOD-POISONING.

86, Charing Cross Road, London,
October 25th, 1895.

Dear Sir,—I have great pleasure in sending you particulars of my experience of the use of Electrozone.

In August last whilst at Tilbury Dock, I accidentally scratched my left hand in two places. As they were only slight scratches I paid no attention to them, and proceeded with my experiments as usual, in the course of which some white lead or paint got into the scratches. A few days afterwards my hand became very painful and much swollen, the scratches became deep dark-coloured sores.

I tried various remedies under medical advice, but without benefit, and there seemed a probability of losing my hand, when I was advised to give Electrozone a trial.

I commenced on the Thursday morning applying lint well soaked with Electrozone to my hand (taking care to use a piece of oiled silk to keep it moist), continuing the treatment daily till the following Tuesday, when to the astonishment of my friends I was able to dispense with bandages and medicine, and to go about my duties as usual.

I remain,

Yours faithfully,

C. W. BOND.

(From *The American Therapist*, Aug., 1893.)

A REMEDY FOR SLOUGHING TISSUE.

Editor of the *American Therapist.*

Dear Doctor,—Last month the members of the Board of Health of this city were invited by Professor A. E. Woolf, Ph.D., of New York, to inspect the preparation and use of a new and cheap disinfectant discovered by himself. The experiments were made in the Union League Club House in the presence of the Board and many members of the League and others who were invited to be present. The disinfectant is made by the action of electricity on sea or salt-water. Not having any sea-water at the time, salt was obtained from the kitchen of the League and a solution made in a glass pitcher, and into this solution electricity was passed for a few minutes. During this process the odour of chlorine was very marked. A piece of putrid meat was immersed for thirty seconds into some of this electrified solution and came out perfectly clean and clear of odour.

In comparison with some other well-known disinfectants at the time, in all percentages, it was shown to be the most rapid and powerful in its action of them all by long odds.

The solution being composed of nothing but salt (sea) water, acted upon by electricity, is perfectly harmless, and no danger arises from drinking it. Thinking it would be a good remedy in cases of sloughing tissue, I determined to try it, and Dr. Woolf was kind enough to send me some made from sea-water in his laboratory.

The first case was a bad *slough of the cornea* from injury of only two days' standing, in which I instilled a few drops of the pure solution, *Electrozone*, as it is called. It caused severe pain for at least ten minutes, and gave all the appearance and action of a strong astringent on the conjunctiva. Finding this too severe I diluted it one-half with fresh water, and instilled it into the eye three times a day for two days, when all the sloughing process was entirely stopped.

The next case was *purulent conjunctivitis* of some days' standing, with the same success in the short time.

Then a case of *conjunctivitis neonatorum* was promptly relieved of the creamy pus discharge in a few days.

Then another case of *complete slough of the cornea* with free discharge was almost immediately benefitted.

These are only my first experiments, and from all appearances I think it is THE MOST RAPID AND THOROUGH DISINFECTANT AND BACTERICIDE SO FAR PRESENTED TO THE PROFESSION.

Dr. Woolf informed us that it has been very successful in the treatment of severe *throat diseases*, and he has known *gonorrheal discharge* stopped in twenty-four hours by its use.

At the same time that Dr. Woolf sent me the liquid he forwarded some to the Board of Health to be used in the Municipal Hospital, and it was at once tried by Dr. Welch, the Physician in charge, on a very bad case of *sloughing variola*, from which the odour was so dreadful that it was impossible for anyone to remain in the tent with the patient but a few minutes. Dr. Welch reports to me that it *removed the odour very much*, but this was not a good case to experiment with, as the man was almost at death's door, really dying a day or two after.

The electricity generates chlorine, bromine, etc., in the process of decomposing the sea-water, and these are well-known disinfectants and microbe killers. Twenty-five years ago Von Graefe recommended the use of chlorine water (aqua chlori) in the treatment of the several forms of conjunctivitis, more especially the purulent form, but it has been replaced by other things that appeared to be more effective. In the last few years, Schmidt-Rimpler has again returned to the aqua chlori of the Pharmacopoeia in all such cases, and I have no doubt he would be more pleased with this electrified sea-water, as it is more active and certain. It is more concentrated, and the combination of the bromine must increase its effectiveness.

I think that this will be found an excellent remedy in *all cases of suppuration* and in various forms of *skin diseases* arising from a micro-organism. Its non-poisonous character should give freedom of experiments, and I call attention to this matter with the hope that it will be given a careful trial by the profession. I have no doubt that Dr. Woolf will furnish the liquid for such experiments as he so kindly did to our Board of Health and myself.

This Electrozone, as it is named, is the same thing that the New York Board of Health has been experimenting with to purify the Croton water at Brewsters, N.Y., and which seems to have been so successful.

Very respectfully,

July 29, 1893.
P. D. KEYSER, M.D.,
(*Senior Surgeon*
Wills Eye Hospital.)

1832, ARCH STREET,
PHILADELPHIA, PA.

A DIPHTHERIA CURE.

(*From a Doctor's Case Book.*)

"Frank V., age 28, Butcher, married. For two days previous to calling me he had been working on the ice pond, much exposed to the inclement weather.

"Feb. 6th. First visit found right tonsil considerably swollen and congested, aching of bones, eyes suffused, soreness of throat, difficult swallowing, T. 102″ P. 100.

"Feb. 7th. Both tonsils swollen, membrane on right one, spots on the left, swallowing more difficult, no sleep, increased swelling of both tonsils, T. 103″ P. 106. Prescribed, Acet. anilid. 2 grs. each, every 2 hours.

"Feb. 8th. Thick membrane on right tonsil, left completely covered, increased tumefaction, swallowing very difficult, no sleep, anxious countenance, tonsils nearly meet, T. 104″ P. 110. Prescribed Tr. Aconite Rad. 1-4 m. Tr. Belladonnae 1-4 m. every hour, Spray Meditrina one part, water four parts. It was interesting to watch the action of the spray ; volumes of vapour came from the throat, and, almost immediately, as soon as I could look into the patient's throat, I noticed the membrane disintegrating. Left directions to continue spraying every fifteen minutes until relieved.

"Feb. 9th. Swelling reduced, membrane dissolving, only a thin glaze over both tonsils ; patient slept sound. T. 100. P. 88. Treatment continued. Spray half hourly : Meditrina one part, water two parts.

"Feb. 10th. Only spots of membrane left. Patient felt much better. Slept at night. T. 99. P. 80. Continued spraying at half hour intervals. Prescribed Comp. Hypophosphites as a tonic.

"Feb. 11th. Membrane hardly perceptible, slight spots on right tonsil. T. and P. normal. Same treatment continued.

"Feb. 12th. Continued improvement.

"Feb' 13th. Throat clear, very slight swelling of right tonsil. Treatment continued. Spray hourly.

"Feb. 15th. Patient discharged. Went out of Town for a holiday."

FRED. A. KINCH, M.D.

DIPHTHERIA.

TRENTON, N.J.,

Nov. 17, 1895.

GENTLEMEN,—Your Meditrina received. I have given it a thorough test as a disinfectant and germ destroyer. We are using it in numerous cases of Diphtheria, with consent of attending physicians, and finding it wonderful in destroying any germs, and completely eating up (absorbing) membrane.

Yours very truly,

WM. H. MICKEL

Health Inspector.

AS A CHOLERA CURE.

230, EAST 27TH STREET, NEW YORK,

September 3rd, 1893.

THE ELECTROZONE CO., N.Y.

GENTLEMEN,—Having been detailed as Head Nurse on Swinburne Island during the cholera epidemic of 1893, I can speak with some authority of the merits of Meditrina as a disinfectant and enteroclysis. Out of thirty cases, I used the Electrozone on twenty with splendid results, only one of which died, and in that one case the cause of death was due to complications of kidney and lung troubles, the autopsy sustaining the diagnosis of the doctors as to the presence of cholera. I think the Meditrina better than all other disinfectants. I have tried them all, and am in a position to say that your Meditrina is far ahead of everything I have ever used.

Respectfully,

IRVING F. KINGSLEY, (M.D.)

Head Nurse, Swinburne Island Quarantine.

(*Government Quarantine Station.*)

"PATIENTS CLAMOURING FOR MEDITRINA."

New York, *April 16th*, 1893.

Dear Sir,—Many of my patients are clamouring for 'Meditrina.' Can I get another supply? I have seen some very striking effects in deodorizing and checking of pus from various regions.

Yours very truly,
CHAS. H. KNIGHT, (M.D.)
Head of Laryngological
Institute of N.Y.

IN A CANCER HOSPITAL.

Philadelphia Home for Incurables,
48th and Woodland Avenue,
January 9th, 1896.

THE ELECTROZONE CO.,
New York City.

Gentlemen,—I am using your Electrozone in the Cancer Annexe of this Home, and as a germicide, antiseptic, and disinfectant it is the best I have ever used. I find it a most valuable article for use in our Home.

Respectfully yours,
CHARLES F. STILES, (M.D.)
Superintendent.

A DENTAL RECOMMENDATION.

(See also in Appendix valuable Article from a Dental Journal.)

Gastonia, N.C.,
November 22nd, 1895.

ELECTROZONE CO., N.Y.

Dear Sirs,—Please send me Dental Electrozone for treating teeth.

The sample sent me has proven to be the best for treating devitalized teeth ever found after 30 years' practice.

Yours truly,
W. H. HOFFMAN, D.D.S.

A REMEDY FOR HEMORRHOIDS.

P. O. Box, 255, Richmond Hill, L. I., Brooklyn,
December 5th, 1895.

TO THE ELECTROZONE CO., N.Y.

"Gentlemen,—I think it is my duty to tell you what I know Electrozone is good for. I suffered for thirty years, off and on, with hemorrhoids ; for the last ten years my suffering was something terrible. I was operated on : had them burned with a hot iron and injected with hypodermic syringe, but they came back, and what I suffered I cannot find words to tell. I met a gentleman at the hotel, who is employed in the controller's office, in New York, who brought me a bottle of Electrozone. I wetted a piece of lint, and placed it against the parts, went to bed—this was nine o'clock, a.m. I was in awful pain, which soon stopped, so I fell asleep. 3 o'clock, p.m., I got up, felt no pain, wet the lint again, and at night I went to bed, injected some, and applied the lint wet with Electrozone. The next morning I had a movement without pain, and I have not been troubled with piles since, though I have applied a piece of wet linen to the parts sometimes before going to bed. I have cured others with Electrozone, and, if you will come and see me, I will point out a man to you who will prove it. Don't think this is an idle freak. I tell it to you for the benefit of those who are suffering with piles. I am willing to swear that every word in this statement is true."

"Yours, etc.,

"CAPT. THOMAS A. BOSSENDEN,

Pilot, Ferry Boat Nevada, Rossevelt Street Ferry,
New York.

PURULENT DISCHARGES FROM THE MIDDLE EAR.

By NORTON L. WILSON, M.D.,

Elizabeth, N.J.,

Surgeon to the Newark Charitable Eye and Ear Infirmary, etc.

The fluid injected should be sterilized with warm water alone, or with some of the following: One teaspoonful of table salt to a pint of sterilized water, one teaspoonful of boric acid to a pint of sterilized water, or two ounces of concentrated solution of Electrozone to one pint of warm water; this is a solution of salt-water with an electric current passed through it. This latter solution has decided germicidal powers, which I have proved by experimentation, and I much prefer it to per-oxide of hydrogen, except in cases where I desire to get the mechanical effect of the latter, and especially where the case hangs on for several weeks. After each syringing the canal should be carefully dried and a plug of cotton introduced into the external canal.

I inject at one sitting from twelve to sixteen ounces of salt-water or boric-acid water, and repeat this three or four times during the day. If the discharge is offensive, I use a one-half-per-cent. solution of carbolic acid, a five-per-cent. solution of permanganate of potassium, or, if necessary, a 1-to-1,000 bi-chloride of mercury solution; but this must be used with care, and I do not allow the patient to use it at home. Here again I prefer a fifteen-per-cent. solution of Electrozone, which is harmless if swallowed. I am in the habit of instilling into the ear a twenty-five-per-cent. solution of neutral per-oxide of hydrogen, and forcing out the pus, rather than for its antiseptic powers, syringing so that the tympanum is free from pus.

MILITARY USES.

Commonwealth of Massachusetts,
Adjutant General's Office,
Boston, *February 27th*, 1896.

ELECTROZONE CO.,
88, Broad Street, New York City.

Dear Sirs,—I have received a favourable report from the Surgeon General regarding "Electrozone."

Will you kindly inform me in what form it is put up, as I desire to use it in the Armouries under control of this department.

I enclose copy of endorsement received from the Surgeon General, and I request that it be not published at present; not at least until his sanction is obtained.

Respectfully,
(Signed) SAMUEL DALTON,
Adjutant General.

Commonwealth of Massachusetts,
Surgeon General's Office,
Boston, *February 26th*, 1896.

Respectfully returned to the Adjutant General with the information that I have had Electrozone tested by practical use in the South and East Armouries and in other places, and can recommend it as a cleanly and effective disinfectant and deodorant. I am using it in my ward at the City Hospital and am pleased with the results obtained.

I recommend that sufficient quantity be purchased and its use in the Armouries be made mandatory for a period of at least six months.

To use it with the best results, each armourer should be furnished with a "sprayer" such as is used to spray plants. Such a sprayer should be constructed entirely of rubber.

(Signed) EDWARD J. FOSTER,
Surgeon General.

IN REGIMENTAL ARMOURIES.

New York,
Nov. 12*th*, 1895.

ELECTROZONE CO.,
66, Broad Street,
New York City.

Dear Sir,—Please send another carboy of 'Electrozone' to the Seventh Regiment Armoury.

We have found it to be of great advantage in keeping the closets in excellent order and proper condition.

I congratulate you upon your success in the production of so valuable an article for public use.

No building should be without it.

Very truly yours,

WM. H. KIPP.
Lieut.-Col. and Chm. Armoury Comm.

Headquarters 7th Regiment, National Guard,
State of New York.
New York, *April* 11*th*, 1896.

THE ELECTROZONE CO.

Gentlemen,—For many months I was unable to conquer the odours arising from the closets used by a large number of men. We could at times overcome this by creating **another odour**, which was almost as bad as the first.

During the past year **Electrozone** has been used, and we are now entirely **free** from any disagreeable odours. The men of the regiment have spoken of this with gratification.

Very respectfully,
(Signed) DANIEL APPLETON,
Colonel.

FOR UNDERTAKERS.

GARRET REDMOND,
Undertaker,
129 & 131, 13th Street Brooklyn.
February 10*th*, 1894.

THE ELECTROZONE CO.,
New York.

Gentlemen,—I herewith send you an unsolicited testimonial in regard to the merit of your disinfectant, which I have used for the last year with perfect satisfaction where all others failed.

One of the best features of your disinfectant is that it does not leave any offensive odour after it has been applied, like all others, which is often worse than the stench itself.

I have used it on the bodies of persons who have been drowned and in the water several days, which, when exposed to the air, gave forth a very strong smell. In these cases it was particularly effective, and also in hundreds of others too numerous to mention.

If you require any further recommendation I shall be only too glad to furnish it, as I appreciate the merits of your disinfectant.

Yours respectfully,

GARRET REDMOND.

ANIMAL DISEASES.

Among the letters was one from a hog farmer, dated September 12th last, Wm. Crenshaw, of Atlanta, Georgia. The first half of the letter runs as follows :—

" We are now confident that Electrozone is a dead-shot for hog cholera. Our experiments, carried out according to Mr. Woolf's suggestions, by mixing Electrozone with the food and drinking-water for hogs sick with cholera and exposed to it, are thus far entirely satisfactory.

"My brother, who is my superintendent, reports, under date of the 10th inst., that *every animal treated with Electrozone has been cured.* We lost five animals before we got the medicine, but not one since. We therefore feel confident.

"Our horses have been cured of Distemper, so my brother writes ; and it seems also as much a specific for Chicken Cholera. My brother writes :—' Each year we have had hog cholera ; we have also had chicken cholera. This season has been no exception ; by mixing Electrozone with the dough given to chickens, they have been cured of cholera. This is a point.' "

FROM THE *Southern Cultivator* [CIRCULATION 160,000], SEPTEMBER 25TH, 1895. ATLANTA, GEORGIA.

A REMEDY IN HOG AND CHICKEN CHOLERA.

BY JEFF. D. CRENSHAW.

With the prospect of making an ample supply of meat for another year almost definitely certain, only those farmers who have had this hope raised, and who have seen their herd swept away as in a day, can understand and fully appreciate my feelings, when on about the 5th day of August, the hog cholera broke out amongst some forty-five animals, all booked for the smoke-house on the first cold snap in December, or perhaps earlier.

In this section, Big Bear Creek, Colbert County, Ala., the cholera has been making havoc for the past six weeks among the hogs. Premises after premises among our farmers have been cleared with unerring certainty. With a dread, born of a lifetime experience of hog cholera, I had folded my arms in submission—ready to bow to the inevitable,—when it was suggested to me that a new antiseptic called Electrozone might cure the cholera. I procured it, and hastily made an effort in experimenting with it. After an experience of nearly a month, during which time about every hog on our premises has had cholera, we have lost three out of a herd of forty odd killing ones.

Electrozone has proved to be in these experiments a specific for which I go on record as saying it will cure hog cholera, and will prove of incalculable benefit to pork producers throughout the land.

So prompt and specific a remedy it is, I cite the following, which to me is little less than miraculous: On the evening of the day I got the Electrozone (10th of August), and had dosed the sick hogs, I thought, to see what effect would follow, I would go to the dead ground where we had hauled off a fine animal as hopelessly gone. I drenched down the throat of this one a mixture of Meditrina (concentrated medicinal Electrozone) and water—two ounces Meditrina and six of water. The result of this was all but a miracle, as, in three hours, this animal got up and walked about, and during the night made his way back to the barn, and is, today, perfectly well.

My experience has been, through all the epidemics of hog cholera in the past, that chicken cholera has been co-existent with it. This season has been no exception, and our chickens were dying. Thinking the disease to be closely analogous to the hog cholera, we moistened the dough, fed our chickens, and during the past month have not lost one on which we have fed the medicated food. In addition to curing both hog and chicken cholera, I have found it a valuable remedy in distemper among our horses and mules.

IN VETERINARY SURGERY.

THE FIFTH AVENUE VETERINARY INSTITUTE.

36, West 44th Street, New York,

Sept. 13*th*, 1893.

"I have used Electrozone in my practice with the very best results, and do not hesitate to recommend it to the profession.

"Injected into abscesses produced from pyaemia (blood-poisoning) I found its effect marvellous in cleansing the cysts and giving at once a healthy appearance."

"JAMES S. CATTANACH, V.S."

CHAPTER V.

ELECTROZONE AND MEDITRINA:

WHAT THEY ARE.

Electrozone (for Domestic and Household Use) and its Medicinal form, Meditrina, are manufactured from purest sea-water through which an electric current has been passed by the patented process owned by the British Electrozone Corporation, Limited.

Electrozone is so called because of the use of electricity and the production of ozone. During the electrolysis the chlorides, bromides, iodides, and other elements of sea-water are converted into hypochlorites, hypobromites, and other favourable compounds, each one of which is absolutely harmless, and all of which act instantaneously upon diseased tissues, killing the germs causing the disease, producing a healthy condition, and aiding Nature. Being a germicide it is an antiseptic, a deodorizer, and a disinfectant. The fact is to be emphasized that it is *absolutely harmless* and *non-poisonous*, and may be taken internally or used externally in any quantities by the youngest infant or the most debilitated octogenarian.

WHAT ELECTROZONE & MEDITRINA ARE GOOD FOR.

One Cause—The Germ;
One Remedy—Electrozone and Meditrina.

HUMAN AILMENTS.

- Malarial Fevers
- Scarlet Fever
- Diphtheria
- Cholera
- Cholera Morbus
- Typhoid Fever
- Whooping Cough
- Tonsillitis
- Pharyngitis
- Rheumatism
- Hay Fever
- Specific Throats
- Eczema
- Carbuncles
- Shingles
- Acne
- Scalds
- Burns
- Fever Blisters
- Croup
- Acute & Chronic Dysentery
- Asthma
- Catarrh
- Colds
- Piles
- Suppurations
- Wound-Dressing
- External Cancer
- Dyspepsia
- Blood Poisoning
- Inflammations
- Female Diseases
- Sore Eyes in Babies

And other diseases of a germ origin.

ANIMAL AILMENTS

- Swine Fever
- Chicken Cholera
- Mange in Dogs
- Hog Cholera
- Pip in Poultry
- Blood Poisoning in Horses, &c. &c.

DOMESTIC USES.

- To Abate Foul Odours
- To Keep Refrigerators and Larders Sweet
- To Prevent Fermentation
- To Destroy Larvæ of Vermin
- To Arrest all Decomposition
- As a Washing and Bathing Fluid

and, generally, to overcome insanitary conditions of whatever kind or nature.

Several years of experience in hundreds of cases, properly attested by reputable authorities, in the foregoing diseases and conditions, justify a confident recommendation of Electrozone and Meditrina.

HOW TO USE ELECTROZONE AND MEDITRINA.

KEEP THE BOTTLE CORKED WHEN NOT IN USE.

1.—***Generally.—In all serious diseases and conditions at once secure the presence of a Doctor, and let him administer Electrozone or Meditrina according to his own judgment.***

2.—Avoid using metal spoons, or atomizers with metal parts, when to be taken internally.

3.—Wherever external uses are indicated, exceedingly good effects are produced by applying lint covered with oil silk dipped into a proper solution (1 to 3, or 4, or 5, parts of water), over such external parts.

[Particulars as to use in various diseases are issued with each bottle.]

ANIMAL USES.

For Swine Fever, Hog Cholera, and other forms of internal disease caused by germs, in cattle, swine and poultry, mix Electrozone with Drinking-water or in food. In acute and extreme cases pour Electrozone down the animal's throat—from one to ten tablespoonfuls mixed with water—repeat at least twice a day. For external cuts, wounds and bruises, in horses and cattle, apply a cloth saturated with a solution of half water and half Electrozone.

HOUSEHOLD USES.

One part Electrozone to three or four parts water poured down sinks, drains, closets, etc., will destroy all smells at once. For destroying vermin pour a similar solution around cracks and into corners. For cleansing refrigerators, meat safes and larders wash out freely with a solution of one part Electrozone and one part water. Have no hesitation in spraying freely over meats, vegetables, butter, etc.

DISINFECTING SICK ROOMS.

Spray freely with an atomizer into the atmosphere of the room a solution of one part Electrozone and two parts water ; the air will be sweetened and noxious germs, caused by the presence of disease, destroyed. Repeat frequently at any time during day and night.

For fumigating a room in which a contagious disease has occurred pour a pint of Electrozone in an open porcelain vessel, add a tablespoonful of ordinary sulphuric acid, and close all doors, windows, cracks, etc., for 24 hours, having removed metallic substances from the room. The chlorine gas generated will destroy the disease germs. Ventilate the room after fumigation.

GENERALLY.

In all serious diseases and conditions at once secure the presence of a doctor, and let him administer Electrozone or Meditrina according to his own judgment.

The instructions given with each bottle are simply of a general character. Solutions may be varied in strength according to conditions, always bearing in mind that the delicate membranes of the body are to be washed or sprayed with very weak solutions. Meditrina is the Doctor's ally. It does not in any way supplant him. His professional skill will indicate its proper use.

TO PHYSICIANS AND SURGEONS.

Meditrina contains from 300 to 325 grains of available chlorine per gallon ; Electrozone contains from 150 to 200 grains. They can both be used freely, but Meditrina is recommended for internal use because of the longer continued electrical action upon the sea-water and the consequent increased purification from insoluble matters. They are the most efficient handwash, wound-dressing, and antiseptic, that have yet been presented for scientific consideration, and will, if sufficiently and properly used, absolutely prevent blood-poisoning.

All diseases in any and all parts of the human or animal body of a germ origin, are favourably affected by the employment of these remedies. Contaminations and blood-poisonings from open cuts on the doctor's or surgeon's hands are absolutely avoided by the use of Electrozone. In midwifery, its use before and after delivery, as a free wash, produces most happy results.

APPENDIX.

SOME PRESS NOTICES OF ELECTROZONE, AND WHAT IS BEING DONE WITH IT.

(*New York Ledger*).

" The electric current has seldom been utilized with such successful results as have recently been obtained by subjecting sea-water to its action.

" The important developments of the value of the new disinfectant, Electrozone, are almost incredible ; and when we consider that, at a trifling cost, a disinfectant can be made which has already proved itself to be a total destroyer of bacteria bacilli—in fact, the whole family of schizomycetes—it is, indeed, encouraging. Scientists have proven conclusively that sicknesses are due to the existence of germ-life ; this fact ascertained, the knowledge that we have a reliable germ destroyer would encourage us in the belief that ere long we will have a potent agent to be utilized as a preventive and cure for those ills to which human flesh is heir. This new discovery, Electrozone, has already purified large bodies of water, sterilized sewage and cured many diseases which heretofore have baffled the skill of our best medical experts, and from experiments now in progress we may be encouraged to hope that the sufferings and distress of the ailing will, before long, be perceptibly diminished.

"The efficacy of Electrozone has already been tested in sloughing cornea, tuberculosis of the rectum, glossitis, ulcers of the uterus, and scores of other sicknesses which have been the cause of grave anxiety to the medical practitioner, and all have yielded readily to the potency of this new product of electricity. When the mode of applying the Electrozone shall have been decided upon, will we not again have reason to be thankful to those who give their time to the development of the many uses to which electricity may be applied, and from which the world will reap such a rich harvest of benefits?

"The tests made with Electrozone have proven it to be non-poisonous; in fact, the investigations of scientists prove it absolutely so, and that in two acquaria containing fishes, an experiment made at the Board of Health, of New York, it was shown that in the aquarium containing a percentage of Electrozone, the fishes were livelier, and lived longer than those in one having water alone.

"This non-poisonous feature would alone recommend this potent agent to the consideration of the careful housekeeper. It is a matter for congratulation that we have at last a new disinfectant which is at once reliable, harmless and effective, and capable of purifying, entirely so, the sick-room, the refrigerator, sinks, closets, etc.

"The fœtid air of schoolrooms may be purified, and the studious little child can run to its home with an appetite instead of the distressing headache which has heretofore been the price paid for instruction. The atmosphere of crowded halls and theatres can be rendered innocuous, hospitals may be entered without trepidation, the surgeon will use his knife without fear of pyæmia, taking from him his patient. In fact, we hail with joy the coming of this child from its prolific parent—electricity.

"The rapid cures of sore throat, burns, cuts, bruises, catarrh, coughs, tooth-ache, ear-ache, etc., will cause the mother more than once to bless the advancing strides of science, and that for little ailments, at least, the doctor may not be disturbed.

"The deodorant properties of Electrozone will become instantly apparent on the application of a small quantity to fœtid or objectionable matter from which bad odours arise.

DENTAL EXPERIENCES.

"C. F. W. BODECKER, D.D.S., M.D.S., NEW YORK CITY, in *The Dental Practitioner and Advertiser*."

"Since all purulent inflammatory processes depend upon an infection of the inflamed tissue with staphylococci and streptococci, it is evident that, by the early application of a proper antiseptic agent, we may prevent the formation of an abscess. Most of the antiseptics, however, which will destroy micro-organisms, are powerful irritants, and will, therefore, disintegrate the tissues to which they are applied, in consequence of which their employment is not always advisable. In dental practice, our principal aim should be to prevent infection with micro-organisms, although in the mouth this is possible only by exercising great care. The oral cavity always contains innumerable bacteria, although the majority of them are inert so long as they remain on the surface of a tissue covered by healthy epithileum. If a single one of these micro-organisms obtain entrance into the depth of the tissue, which, at the time, is in the stage of non-purulent inflammation, an abscess is the result. Such infections easily occur after wounding the mucous membrane of the mouth, as well as in consequence of gangrene of the pulp. In both instances, however, by the timely employment of proper antiseptics we may be able to prevent a purulent inflammation, although it is a fact that most of the antiseptics in common use are ineffective in accomplishing this result. The writer has, however, lately made use of a new preparation called "Electrozone," which, so far as his experience reaches, **has given uniformly satisfactory results.** This fluid, which is nothing but sea or salt-water that has been subjected to an electrolytic current, is an admirable antiseptic. It is a clear liquid, neutral in reaction, smelling somewhat of free chlorine, and has a rather disagreeable, salty taste.

"From the above statements, which my limited experience corroborates, we have to admit that **Electrozone is the most powerful antiseptic known without being poisonous.** The writer has used it in his daily practice since last March, with surprisingly good results. As a mouth wash, and wherever a strong antiseptic action is required, it has no equal. Of greater importance, however, is the prompt sterilization of septic matter in a gangrenous and purulent pulpitis. In most instances, pericementitis follows the removal of remnants of the pulp when in a gangrenous or purulent inflammatory condition, or the removal of septic material from the pulp canal.

"The cause for such an infection of the pericementum is evident. If a nerve broach be introduced into a pulp canal the entrance to which is filled with micro-organisms, the broach will carry some of them along to or through the apical foramen of the root, even though portions of the pulp be alive at the time of extirpation. Bacteria are organisms so minute that they can only be detected by the aid of the microscope, with a magnifying power of at least 600 diameters. Every human mouth is crowded with them, and during operations, our fingers, instruments, and everything with which they come in contact, are infected with micro-organisms. In this manner, nerve instruments, although they may have been previously sterilized, if they are afterward permitted to come in contact with our fingers, the handles of instruments, napkins, towels, etc., which have been touched by our fingers during an operation, may infect the pericementum. Thus it becomes explicable how micro-organisms may obtain entrance to the pericementum, even though ordinary care may have been used. The question then arises: can we obviate an infection of the pericementum? This, certainly, is possible, if great care and judgment are exercised.

"The writer's method is as follows:—

"In a case of purulent pulpitis, partial or total gangrene of the pulp, the diagnosis of which should be fully clear, the pulp chamber should be opened freely, which usually will instantly relieve the pain. The pulp chamber of the tooth should then be syringed out with tepid water, to which has been added some Electrozone. A small piece of cotton, saturated with pure Electrozone, is then introduced into the pulp chamber, followed by one or two larger pledgets, also moistened with Electrozone. The patient is then directed to renew only the last piece of cotton, from three to five times daily, or at least after every meal, using the precaution to rinse the mouth with a weak solution of Electrozone (about a teaspoonful to a tumbler of water) previous to the removal of the cotton. Every pledget of cotton, previous to its introduction, should be moistened with pure Electrozone, and packed as tightly in the cavity of the tooth as possible. When the tooth has been treated in this manner for two or three days, the pulp canal may be cleaned out and filled at once, without any fear of future pericementitis, provided that an infection of the pericementum has not already occurred.

"To clean out and fill a pulp canal successfully, the rubber dam should be applied, and when in position be moistened with pure Electrozone. The hands should then be thoroughly washed again, and also disinfected with the same agent. All the instruments to be used should be immersed in pure Electrozone. The tooth to be treated is carefully cleaned with a piece of cotton moistened in the same antiseptic, after which the cotton may be removed from the pulp chamber of the tooth. If little of the pulp is found to be alive, this may be extirpated at once, without much pain, by means of a fine nerve drill, rapidly revolving in the head-piece of the dental engine. Previous to the introduction of any instrument into the pulp canal, the latter should be flooded with pure Electrozone, and no air should be allowed to enter the pulp canal after the extirpation of the pulp, until it has been thoroughly disinfected. The canal may then at once be filled with safety, and if the filling material has been made sterile, and is not pushed through the apical foraman of the root, the tooth will give no further trouble.

"As a mouth-wash, the writer has made use of the antiseptic with gratifying results, although, on account of its disagreeable taste, it is objectionable to some patients. If, however, it is diluted with water, ten to twenty volumes, its taste is not so obnoxious, and in such dilutions Dr. E. A. Martin pronounces it still the most powerful antiseptic known. The writer has made use of it in such diluted form in the treatment of empyema of the antrum, necrosis of the jawbones, alveolar cysts, and pyorrhoea alveolaris, with similar good results."

(*Frank Leslie's Weekly.*)

PURIFYING THE UNCLEAN.

" Nearly all of the diseases which come as scourges to destroy life are to a great extent due to uncleanliness. Filth needs to be fought on every hand, and even when the individuals of a community personally cultivate and practise cleanliness it is not always sufficient to keep off an attack from cholera or other germ disease. The water-supply becomes contaminated by the drainage, and frequently great harm is done even before danger is apprehended. Sanitation as a science is comparatively new, and with the best means at command medical men and sanitary experts have hitherto been unable to disinfect germ-breeding localities when large in area. The sewage of villages, that drain into swamps which lead even indirectly into streams tributary to rivers and lakes from which the water-supplies for large cities are drawn, has been known to do incalculable harm before it was suspected that such drainage could sufficiently pollute a great body of water, and render it dangerous to health and life. The careful investigation of recent years has made it manifest that there is danger from whatever source of pollution, however remote and however seemingly insignificant This having been established, the problem had to be solved as to how the drainage could be kept away from streams feeding city reservoirs, or how to render this drainage harmless.

" And here is where the sanitary experts broke down. Villages could not be wiped out nor could the natural flow of the drainage be diverted into other channels. There were, to be sure, certain well-known chemical disinfectants that could be used on a small scale, but these could not be so applied as to effect great results—such, for instance, as making harmless the foul sewage that collects in quantities wherever there is any density of population. But this has been accomplished recently by an electrical engineer, Mr. A. E. Woolf. In a recent number of this paper we printed an article that described the process used by Mr. Woolf to disinfect the sewage of the village of Brewsters, a little place within the Croton water-shed. As explained in that article, this process depends upon the electrolysis of a saline solution which after being subjected to the action of a powerful electric current, is added to the polluted stream which flows into the Croton River. The action of the electric current converts chloride of sodium—that is, salt—into hypochlorite. This means that the union of chlorine and sodium is broken and a new compound is formed which contains both these elements joined in a certain fixed proportion to oxygen. It is understood that the presence of some other chemical in the solution facilitates this process. When sea-water is used other chlorides and bromides are also present and undergo, under electrolysis, a similar transformation.

"Like chlorine, the hypochlorite of sodium is an active disinfectant. Just what the chemical reaction is, chemists are not agreed upon, but the effect on organic impurities is supposed to be something like this: On account of the affinity of chlorine for hydrogen, in the presence of organic matter the hypochlorites are decomposed. The organic matter is also broken up, in part, at least, into its elements. Chlorine is set free and enters into new combinations which are innocuous, and ozone gas, a powerful oxidizing agent, is generated. In actual practice, it is said, the various chemical reactions mentioned occur at the same time, and instantaneously.

"With this process, as explained in the article previously alluded to, Mr. Woolf has so satisfactorily disinfected the sewage of Brewsters that it is now harmless to injure the New York water-supply. The quickness with which this was done seemed magical, and its cheapness made people who believe that all good things must be expensive, doubt as to the effectiveness of the disinfection. But all this has been demonstrated to the satisfaction of chemists and sanitary experts.

"With such a cheap and effective method available there is no reason why the water-front of any city should be permitted to remain foul. And there is not a river-front in any large city that is not about as bad as possible. The Chicago River is probably the foulest stream in all the world. This can unquestionably be disinfected by the Woolf process, so that it will not pollute the waters of Lake Michigan or contaminate the air of the great inland city.

"This Woolf process of disinfection is a public benefaction, and it is to be hoped that it will be adopted whereever there is filth and uncleanliness to pollute the water we drink and contaminate the air we breathe."

(*Electrical Engineer*, AUGUST, 1894.)

"Editorial reference was made in these pages last week, to the activity in modern times in matters of sanitation, and to the general recognition of the fact that public health is affected very favourably by the steps taken for the purification of drinking-water, the disinfection of sewage and the disposal of garbage. Note was made, in this connection, of the work now in progress at Riker's Island, where several acres of solid garbage, the accumulation of seven months' steady dumping, are being sterilized and deodorized by a liberal application of Electrozone.

"Deeming the matter of more than usual importance, one of the editors of this journal has made it his business to investigate the work at Riker's Island, and the results are printed in our present issue. It will be seen that the article is a simple statement of facts, from which our readers may draw their own conclusions. Having, however, been witnesses also of the work previously carried out successfully at Brewsters, with Electrozone, in the purification of both drinking-water and sewage, we do not hesitate to express our own conviction that electricity has now furnished sanitary and medical authorities with a most powerful agent for good. It seems impossible that so many investigators and observers in so many different fields can be mistaken ; and, if they are not mistaken, then the widespread use of Electrozone becomes a matter of necessity and duty. For many of the large cities of the world, the supply of sea-water to be electrolized is easy and inexhaustible ; while for inland centres of population the production and treatment of salt-water should prove neither difficult nor expensive.

"Two full pages of *Harper's Weekly*, of August 4, and an editorial, are devoted to the nuisances on Newton Creek, Brooklyn. Our contemporary calls with energy upon the Brooklyn authorities to rectify the evils there at once, to fill in the Creek, and to reclaim the low lands. We venture to direct the attention of the *Weekly* and of the Brooklyn authorities to what electricity has done at Brewsters and Riker's, and to suggest a trial, right off, of the same remedy. As we go to press, we note the commendation by the New York Grand Jury of the work at both places, and their remark, as to Riker's, that the land thus reclaimed from the river and built up from purified street sweepings, will be of inestimable value to our city in the near future. Once again, electricity proves itself to be a potent agent in raising the standard of city comfort, convenience and cleanliness."

WHO SHOULD USE ELECTROZONE?

Possessing as it does, the qualities described in the pages of this publication, it is certain that

ELECTROZONE—in bulk by large users and in bottle for domestic purposes—and

MEDITRINA—the Medicinal form must be largely used by: –

Municipal Corporations

For disinfecting sewers and sewage, watering streets, purifying drinking-water, etc.

Water Supply Companies

For sterilizing and purifying purposes.

Manufacturers and Brewers

To render innocuous the dangerous and discolouring compounds produced in their respective factories, and allowed to pollute streams and rivers.

Owners and Occupiers of Country Houses

For stables, cesspits, and the like, thus preventing typhoid fever, diphtheria, and other diseases arising from insanitary conditions.

School Boards and Managers, Church and Chapel Committees, Theatre Managers, and other controllers of buildings which are often crowded, and thereby rendered noisome and dangerous, the buildings being made fresh and pure by sprinkling and spraying of Electrozone.

Ship Owners

In disinfecting holds, steerages, drains, bilge pipes, &c.

The British Electrozone Corporation,

LIMITED.

Offices: Trafalgar Buildings, Charing Cross, LONDON.

Works: SEAHAM HARBOUR, DURHAM.

WHO SHOULD USE ELECTROZONE?

Boards of Health

For disinfecting insanitary districts, preventing the spread of contagious diseases, arresting epidemics, and sterilizing rooms and localities after the presence of contagious diseases.

Governmental Authorities

For all quarantine stations, and for uses in tropical and semi-tropical countries, in barracks, and other buildings, and in hospitals for frequent uses in all wards.

The Household

For all domestic purposes, replacing ammonia and disinfectants now in use, which are *poisonous if effective*, and *non-effective if non-poisonous*; to exterminate the larvæ of vermin of all kinds; to destroy all stenches, and to render places previously insanitary sweet and healthful.

Sufferers from Germ Diseases generally

As an ally of the doctor.

Medical Practitioners

Generally for employment in all kinds of germ diseases, and for treatment of wounds, cuts, contusions, &c.

Dentists

For carious teeth, ulcers, foul breath, abscesses, &c.

Cavalry Officers, Veterinary Surgeons, Livery Stable Owners, Cattle Breeders, Farmers, Dog, Fowl and Bird Fanciers, and others, for medicinal (external and internal) treatment, and for disinfecting purposes, &c.

The British Electrozone Corporation,

LIMITED.

Offices: Trafalgar Buildings, Charing Cross, LONDON.

Works: SEAHAM HARBOUR, DURHAM.

WELLCOME LIBRARY INSTITUTE